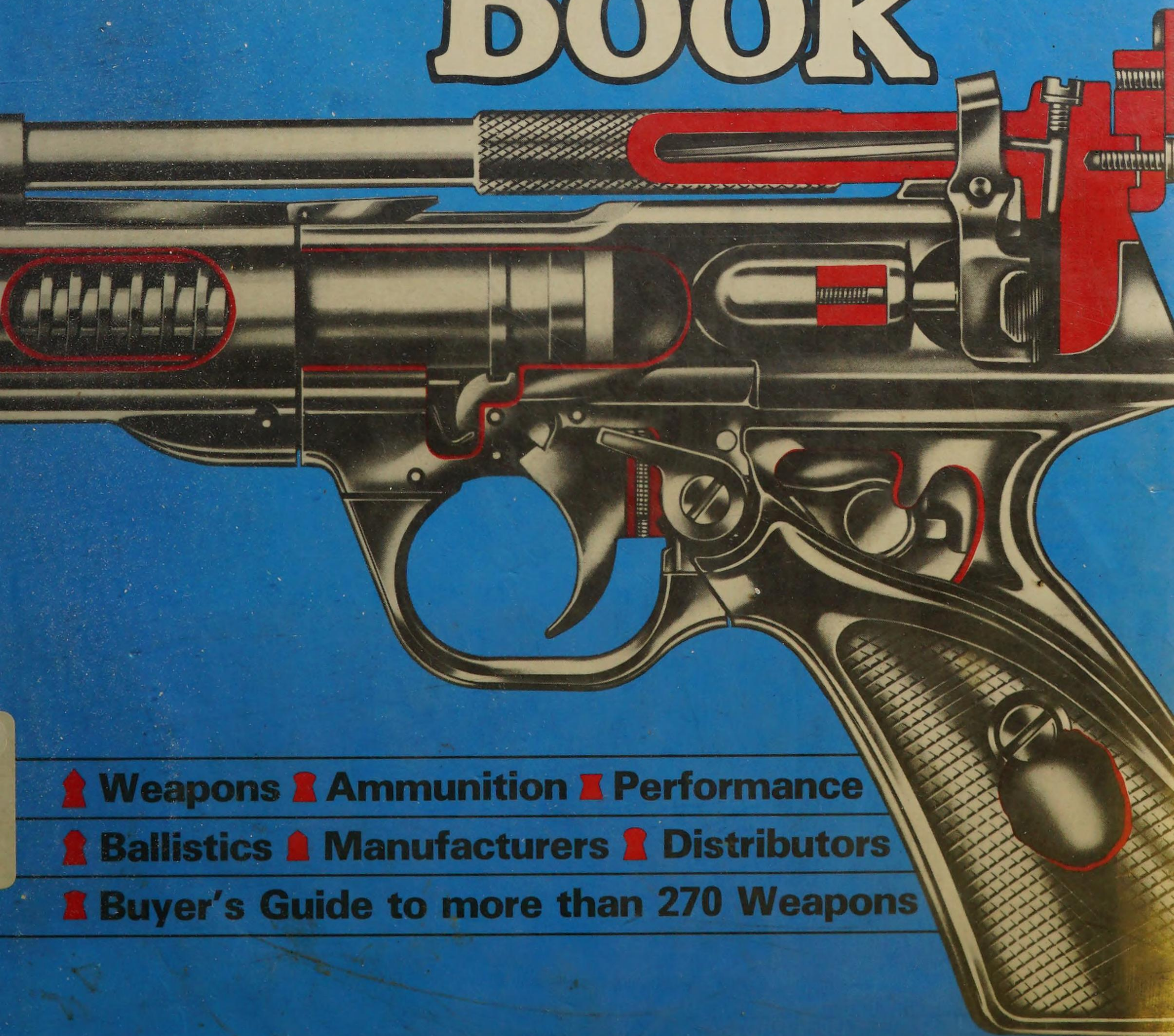


The Airgun Book

John Walter



- Weapons
- Ammunition
- Performance
- Ballistics
- Manufacturers
- Distributors
- Buyer's Guide to more than 270 Weapons

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The Airgun Book

This book provides the airgun enthusiast with a much-needed basic book on his subject. For the first-time purchaser of an airgun, it will provide a realistic, unbiased guide to the many models available; for the experienced airgun shooter it will be an indispensable work of reference. It includes:

- An introduction to the principal operating systems
- A discussion of airgun features and a guide to design trends in the 1980s
- A gun-by-gun guide to over 270 spring-air, pneumatic and gas-powered guns currently on the market, each entry accompanied by basic technical information and each gun graded according to value for money, construction, ease of use, suitability for target shooting and suitability for 'plinking'
- A guide to airgun performance and ballistics
- Airgun ammunition: data on the brands available

The Airgun Book is fully illustrated, with over 200 photographs, cut-away views and exploded-view drawings, as well as a unique series of graphs demonstrating the results of tests carried out by the author to explore the consistency and accuracy of individual weapons. In addition, there is a quick-reference chart enabling the reader to compare the features and qualities of the various rifles and pistols available.

The author, John Walter, has written several books on firearms and edged weapons and is himself a keen airgun enthusiast. He has enjoyed the co-operation of the majority of the manufacturers of airguns, and has personally tested virtually all of the weapons reviewed in this book.



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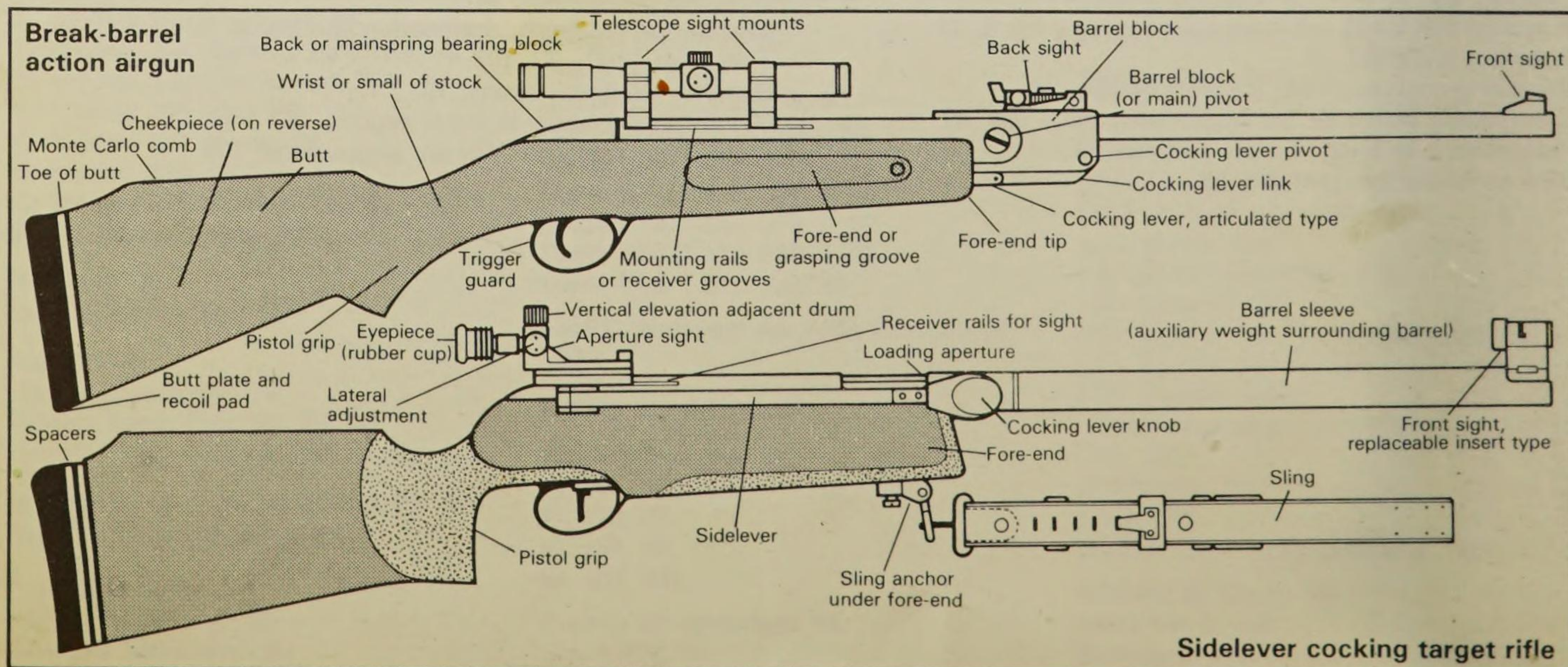
ADL†	Accuracy deviation limit	pkg	Packaging
agw	<i>Airgun World</i> figures	ps	Piston seal
bd	Ball diameter	PTFE	Polytetrafluoroethylene
bf	Figures supplied by Dr. Robert Beeman	ptu	Plastic tube
bl	Barrel length	rf	Type of rifling
bs	Breech seal	rm	Remarks
C*	Confidence limit (2.33 throughout)	rpb	Round plastic box
cal	Calibre	s	Seal(s)
cb	Cardboard box	sd	Skirt diameter
cl	Class. For explanation of classes used, see page 135	sft	Safety
col	Packaging colour	t	Tin
d*	Difference between the velocity of any single shot and the average velocity	tb	Tin box
DE PS	Deutsches Patentschrift (German patent)	V_a^*	Actual velocity
dia	Diameter	VDL†	Velocity deviation limit
fp	Foot-pounds	V_{mn}^*	Minimum velocity
fs	Feet per second	V_{mx}^*	Maximum velocity
g	gravitational acceleration	VR†	Velocity range, the difference between the maximum and minimum velocities in a test series
GD†	Greatest difference between any two successive shots in a test series	V_x^*	Average or mean velocity for a test series, the sum of the velocities of the number of shots.
hd	Head diameter	wt	Weight
J	Joule	Σ^*	Greek letter sigma; the established statistical symbol for the total of any terms.
jg	Figures supplied by Dr. J. S. E. Gilbert		
loa	Length overall		
mag	Magazine		
max	Maximum		
mf	Manufacturer's figure		
min	Minimum		
n	Number of shots in a test series		
N/A	Not available		
nd	Nominal diameter		
nf	Nominal figure		
nm	Not measurable		
nsv	No significant variation (below .001in)		
pb	Plastic box		

All velocities quoted in this book were measured at the muzzle, unless stated otherwise.

Safety catches are classed as '**automatic**' if they are applied automatically when the breech is opened and deactivated automatically as the breech is closed; '**semi-automatic**' if they must be reset manually before each shot; and '**manual**' if their entire on/off cycle is at the firer's discretion.

*Terms marked thus are either standard statistical symbols or widely used elsewhere.

†Terms unique to this book but which may, ultimately, achieve much wider use.



Sidelever cocking target rifle

The Airgun

Airguns have undergone continuous – if tortuous – development since the sixteenth century, though many of the most important technical advances have been made in the last twenty years, with the perfection of recoilless spring-air rifles. There is insufficient space here to attempt anything other than a brief summary of the major operating systems, and it is regrettable that the two major books, Smith's *Gas, Air & Spring Guns of the World* (first published in 1957) and Wesley's *Air Guns & Air Pistols* (1955), are now well out of date. (Leslie Wesley's book has been revised recently, but the changes made are really quite insignificant.) Much useful data will, however, be found in the 'Airgun Scene' column of the British magazine *'Guns Review'*, compiled by Dennis Commins, which has done much to encourage the proper study of airguns. The magazine has also contained several excellent ammunition articles by Dr. Joseph Gilbert. A similar, but less comprehensive airguns column by Roy Valentine ('Harvey') may be found in *Airgun World*.

CLASSIFICATION

The father of **gas operation** is regarded as the Frenchman, Paul Giffard (1837-97), whose first designs appeared in the 1860s. The guns of Giffard and his successors were usually powered by liquefied carbon dioxide – then known as 'carbonic anhydride' – but an unsuccessful attempt to use dry ice, solid carbon dioxide, was made in the 1940s. Recent experiments with propellants such as freon have as yet had no commercial impact other than the LARC gas-power submachine-gun, and most guns still use carbon dioxide in small sealed cylinders which are pierced after insertion. (Some obsolete designs such as the Swedish Excellent and early Crosmans were charged from separate reservoirs.)

The **pneumatic system** was once very popular, as the proliferation of surviving ball, butt and barrel-reservoir guns testifies, but charging was a difficult and often dangerous process, as some reservoirs required several hundred pump strokes to reach satisfactory pressure, and fatalities from exploding reservoirs occurred periodically. Pneumatics used 'pre-compressed' air, distinct from the essentially different spring-air guns in which compression is achieved during the firing cycle. By far the most popular means of charging a pneumatic gun is a hinged fore-end lever, several strokes of which fill the reservoir through a non-return valve. This multi-stroke system is widely associated with many US Benjamin, Crosman, Sheridan and Daisy guns. A few less powerful but more convenient single-stroke pneumatic designs will be encountered, the recoilless Walthers being the most famous representatives, though the principle is shared by

the Daisy 717 and 722 in addition to the Italguns CU400.

Spring-air guns represent 75 per cent of the guns seen in Britain, despite the recent efforts made by Millard Brothers and the Sussex Armoury to distribute Daisy, Benjamin and Crosman guns. Spring-air operation originated prior to 1605, but was relegated to obscurity until the emergence of gallery guns and then cheap BB guns during the nineteenth century. The operating principle is simplicity itself: an assembly of one or more springs, compressed by a series of levers, drives a sealed piston along the bore of an air cylinder, compressing the air and propelling the projectile along the barrel. The most popular seal is a leather or synthetic washer on the piston head, providing an airtight barrier between the head and the air-cylinder wall.

BASIC ACTIONS

Break barrel. This is the simplest and most widely used system. A cocking lever is attached to the barrel or barrel block, often by an intermediate link to minimize lever displacement, and pushes the piston and spring assembly back in the air cylinder until caught by the sear or trigger. The cocking lever is pulled forward again when the barrel is returned to the firing position. Pulling the trigger allows the piston to fly forward and the cycle can begin again. There are countless variations of the basic system; most rifles carry the air cylinder in the stock, above the fore-end, though the Walther LP53 pistol has its cylinder in the butt – a system once common on cheap Gem-pattern rifles. Earliest example: Pettengill's patent (US, designed in 1870), later exploited by Haviland & Gunn and Quackenbush. Significant types: too many to mention. However, the air cylinder of the Bonehill Britannia (Frederick Cox, GB, 1902–4) formed the wrist and lower part of the butt, giving compactness. The Lincoln pistol (Lincoln Jeffries, GB, 1911–21) inspired the Walther LP53. Modern representatives: too many to mention.

Underlever or swinging fore-end. The barrel of these guns usually acts as a fixed extension of the air cylinder and the action is cocked by a separate lever or levers, pivoted to the underside of the breech, which acts on the piston. Most guns are loaded through an inconvenient separate rotary plug. Several autoloading plugs have been developed, but most proved troublesome and were too expensive to make. Underlever designs are usually very strong, but 'weaker' break-barrel guns have been unnecessarily pilloried by advocates of underlever operation. The most efficient underlever action is generally agreed to be the BSA Airsporter of 1948–80, though most other types differ from one another solely in the layout of cocking levers and links; they are more

difficult to make than break-barrel guns, and may leak air from the loading plugs unless carefully machined.

The swinging fore-end, associated with the American pump-up pneumatics, is invariably pivoted at the muzzle and compresses air into a reservoir by a system of levers and/or links. An essentially similar swinging underlever found on the Daisy Powerline series (originally known as the Powerking), introduced in 1974–75, comprises a skeletal alloy handle projecting from the underside of the frame. Earliest example: Jeffries patent (GB, 1904), though some US gallery guns used rudimentary underlever operation in the 1860s. Significant types: Jeffries and Jeffries/BSA rifles, 1906–39, and foreign copies. Modern representatives: BSA Airsporter series, Mayer & Grammelspacher Original Diana 50, Telly Tornado and Super Tornado, Chinese B-45-3 Lion.

Sidelever action. This system, with vertical or lateral lever movement, has recently been popularized by the Anschütz, Feinwerkbau and other target rifles, whose recoilless design made conventional barrel-cocking and underlever systems unpractical. Sidelevers of reputable make have safety ratchets and interlock devices to prevent premature piston release, but some bad accidents have occurred with cheaper products. Earliest examples: US 'Upstate New York' gallery guns, 1860–70. Warrior pistol (Anson & Clarke, GB, 1931). Modern representatives: Anschütz LG220 and LG250, the Feinwerkbau LG150, LG200 and LG300 series, several Hämmerli guns, Webley Osprey, Walther LGR, Daisy 717 and 722 pistols, Italguns CU400.

Lever-action. This system is especially common in the USA; it is ideally suited to low-power designs, though the M1894 Daisy 'Spittin' Image' cocks on opening and closure to gain more power than normal. Most types use the trigger guard, or an extension of it, to gain leverage, though others may be considered more as swinging fore-end designs (see Underlever action). Earliest examples: Continental Bügelspanner guns, early US Victor (George Weaver, 1890) and Columbia (Elmer Bailey, 1892) BB guns. Significant types include the Falke Modell 33 and the Abas Major, in addition to vast numbers of Daisy, Markham/King and other BB guns. Modern representatives: the Walther pneumatic pistols.

Top-lever action. Very few of these guns have been made, excessive length making the system ill-suited to rifle design. Typical examples: the pre-1939 Venuswaffenwerke Tell III and Moritz & Gerstenberger Zenit, examples of which were made by Stiga and Millard Brothers in postwar years.

Break-action (break-butt, break-frame or break-grip). This rarely-seen system was once much more common, but manufacturing problems, complications and a necessarily limited cocking stroke caused its demise. Barrel-cockers are far easier to use, as break-action guns normally require separate loading, though the break-butt system was once popular on US BB guns pioneered by Daisy (Clarence Hamilton, 1887–1901 and others). Typical examples: Venuswaffenwerke Tell II, Haenel-Schmeisser pistol models 26, 27 and 28, Acvoke (John Arrowsmith, 1945).

Slide action, pump-action or longitudinally moving block. This inherently low-power system, widely

favoured by Daisy, rarely involves much mechanical advantage. There are two principal sub-varieties: the elbow pump, with inbuilt additional leverage, and the simpler straight-line (or rectilinear) pump. The Remington M26 (Crawford Loomis, 1926–28) used a complex rack-and-pinion action, falling into neither category. Earliest examples: an experimental Benjamin pneumatic, Daisy No. 25 (Charles Lefever, 1913). Modern representatives: several Daisy designs, Crosman 622.

Push-in barrel. This once-common system is now confined to a few crude, low-cost guns, mostly pistols, exhibiting a number of severe drawbacks, not least of which is the appreciable change in the centre of gravity when the barrel flies forward on firing. This, and the sudden shock as the barrel is halted, makes accurate shooting virtually impossible. Typical examples: Mayer & Grammelspacher Original Diana Modell 2, Schmidt HS9A, Milbro Diana G2/5 and SP50, Harrington Gat.

Lifting or pivoting barrel. The barrel of these designs, usually secured by a catch, may be pulled upward to cock the piston. It may be hinged at the muzzle or breech, and usually operates the piston through an intermediate link or link system. The perfected Webley & Scott pattern, used on the Premier and Senior pistols, obtains an unusually long stroke from a secondary intermediate link. Earliest example: Improved Britannia (Bonehill & Homer, 1907). Significant types: Webley & Scott (Johnstone & Fearn, 1923), Certus (Edgar Harrison, 1929–30) and others. Modern representatives: Hy-Score (Lawrence & Laszlo, 1938–46), various Webleys, FAS AP604.

Bolt action. There are many variations of this cocking system which, though convenient to use, is unsuitable for high-power designs. The advantage gained by use of the leverage (the short bolt) is inferior to that obtained from a long barrel, though the Czechs successfully increased bolt length by burying the pivot in the butt (Česká Zbrojovka, 1935). (NB: many pneumatic and gas-operated designs have bolt-type loading systems.) Earliest examples: Adalbert Kempe's patents, Germany, 1882. Significant types: many made by Will, Mayer & Grammelspacher and others, and the Haenel Sportmodelle (Hugo Schmeisser, 1933). Modern representatives: Anschütz LG275, Haenel-Thälmann 311, Mayer & Grammelspacher Modell 30, Crosman M70.

Backstrap lever. This system is now rarely encountered. In many obsolete examples – Tell II, Acvoke – it was combined with a break-butt system (see Break-action system), but the Lincoln Jeffries Bisley pistol of 1912–13 was a true backstrap-cocker.

Pull-trigger action. This incorporates minimal mechanical advantage and obviously cannot be applied to a spring-air gun of any power, but is commonly encountered on semi-automatic gas-powered designs where its only function is valve control.

Reciprocating or sliding rod ('push-pull rod'). This once popular but now obsolete system is very awkward to use, as illustrations in early Benjamin catalogues show. The butt-mounted push-in rod of the British Titan pistol (Frank Clarke, 1917–22) ran forward into the air chamber, but failed to find any other application. Earliest example: Paul Giffard, c.1862. Significant types: early Benjamin models. Modern representative: Yew-Ha 3B.

Thumb-cocked hammer. This action is ill-suited to airguns; the Daisy No. 179 Six Shooter (1960 to date), widely listed as a spring-air design, uses spring power only.

Crank-wound, push-lever and other systems. A search of patent records reveals many curious cocking systems. Because good claims were made by professionally-advised inventors and manufacturers, most remaining cocking methods are unpractical. The crank-wound pattern enjoyed its heyday in the pre-1880 era, before the advent of cheap Quackenbush and other BB guns. Most Kurbelspanner and volute-spring gallery guns were cocked by inserting a crank handle in a socket on the butt or receiver and 'spanning' the spring-powered piston mechanism. The action was used in Parker's Patent Precision Pistol (Hale & Harris, 1920) and shared in the short-lived success that the pistol enjoyed. The last guns to use this type of action were made in the late 1930s. There was also a brief flirtation with a push-lever lock (Hebelscheiber Verschluss) in which the barrel broke downward – as in break-barrel systems – but then pushed a straight cocking plunger against the piston. These guns date from the late nineteenth century.

FEATURES

Most modern airgun barrels contain **rifling** to spin the projectiles. The style of rifling may vary, as does the depth of the grooves and their width in relation to the lands, and also the pitch of the twist – a way of expressing its degree of inclination. Many makers now seem to have settled for 8-, 10- or 12-groove twist. (However, many barrels are made by sub-contractors, such as Hämmerli, which explains some similarities.) Markedly different velocity ranges should have different rifling pitches, as rotational velocity and the gyro-stabilizing effect, eliminating variables such as pellet-weight distribution, will otherwise differ. There is probably an optimal rifling profile and pitch, but many manufacturers rifle their airgun barrels similarly to their smallbore cartridge rifles to facilitate manufacture. Fortunately, this does not seem to have had an adverse effect on the performance of the slower-moving airgun pellets. Smoothbore guns – including some Mayer & Grammelspacher designs – may still be acquired, but the practice has died out in the last decade except in the USA and Spain. The accuracy obtainable from rifled or smooth bores, comparable at short distances, differs markedly at ranges of 10m or more, when the smoothbore projectiles, lacking gyro-stability, tend to wander off course. Diabolo pellets and round lead or coppered-lead shot can usually be used in any type of barrel, though most US BB guns are smoothbored, as the extra expense of rifling is wasted on their inherently inaccurate low-velocity ball-type projectiles. Airgun darts are damaged in rifled bores and have an undesirable reciprocal effect on the rifling grooves; the exception to this being the synthetic-bodied re-usable Ballistic Bolts, a form of dart, introduced by the Sussex Armoury in 1980.

Virtually all airguns made before the 1930s – in Europe at least – had the classic **stock** style. The separate wooden butt was attached to a long unsupported spring

cylinder, but it was soon realized that the 'butt only' design was not only unsightly but gave poor hold. Depending on his shooting style, the marksman's front hand often rested uncomfortably on the air cylinder or the cocking lever assembly. Haenel, Mayer & Grammelspacher, Venuswaffenwerke and others, therefore, developed better-handling one-piece stocks of the type now encountered on virtually every air rifle. The British airgun manufacturers adopted stocks of this pattern when BSA, Webley & Scott and Millard Brothers recommenced production in the late 1940s.

A properly shaped **cheekpiece** undeniably assists comfortable shooting; while the so-called **Monte Carlo comb** raises the line of the cheekpiece, which is useful if an aperture or telescope sight is carried high above the bore axis. Similarly, a well shaped **pistol grip** will facilitate consistent trigger usage.

The regrettable demise of hand-cut **chequering** during the last two decades has encouraged use of the cheaper pressed or rolled-in type, which is rarely as sharply defined, and the makers of the leading target rifles – forced to roughen large areas – have developed an acceptable stippling process. A few companies, such as Hermann Weihrauch of Mellrichstadt, famed for the quality of its deluxe walnut-stock blanks, have managed to maintain quality on their higher priced products, but they are the exception to the general rule. Greater attention to detail has characterized stock designs since 1960 and has led to the restrained use of white **spacer plates** between the butt and butt-plate and the pistol grip and grip-cap. Similarly, the introduction of attractive rubber and ventilated rubber **butt-plates** has improved shooting comfort by lessening the apparent effects of recoil and spring-surge. Stock design, of course, is largely a matter of personal preference and varies according to the manufacturers' marketing ideas; in addition, there are regional variations such as the Bavarian cheekpiece and the Tyrolean high-comb stock (Tirolerschaft), both of which look strange to British eyes. Hämmerli developed a series of gas-powered guns in the mid-1960s with elegantly conceived if curious 'squared' butt, cheekpiece and pistol grip contours, but – perhaps mercifully – few others have followed this lead.

Several **military-style airguns** have recently appeared, and grave concern has been voiced about the potentially dangerous confusion that could arise, even though none of the airguns duplicates the appearance of a cartridge rifle. Thumbhole stocks and separate pistol grips undoubtedly assist accurate shooting, but the BSA Buccaneer and the French Manuarm rifles incorporate similar features without overtly resembling assault weapons. However, it can be argued that amongst the most militaristic airguns are two that are not usually mentioned – the Milbro G5 Cougar and the Chinese B-45-3 Lion – in addition to the more obvious choices, the Sussex Armoury Jackal and the Crosman M1.

Stock finishes have also undergone changes, and opinions again depend very much on personal preference. No time can now be spared to finish and oil-rub the best walnut blank for every gun, and much stock manufacture is undertaken on automated shaping machines – several at a time, rough-sanded to a master

pattern — and the end products receive a coat of sparkling acrylic melamine, polyurethane or similar high-gloss synthetic material. Again, a lot of work is subcontracted.

The barrels of the majority of airguns made since 1900 are held closed by a spring-operated **detent or passive lock**, which opposes the downward effort of the barrel weight and must be overcome before the cocking stroke commences. The modern spring-loaded ball catch was patented by Jacob Mayer of Mayer & Grammelspacher in 1901. The ball — or wedge-shaped nose of the bolt in other variations — engages a shoulder under the receiver, retaining the barrel and minimizing the effect of wear in the joint. There are many modern detent-locking systems, differing in detail rather than concept. Many guns still use the spring-loaded ball, while BSA's patent lock — designed by Josef Veselý and Roger Wackrow in 1959 — meshes with a transverse pin.

A stronger and more efficient system was required for guns with heavy barrels, and a variety of **active (or positive) locking devices** exist. The barrels of positively-locked guns cannot be opened until the catch is released, unlike detent systems which are opposed only by spring power and friction. Many differing locks were developed prior to 1914; some versions of the Haviland & Gunn/Quackenbush 'Gem' had a pivoted combination locking bar and back sight atop the receiver, while rifled examples of the Langenhan-made Millita, distributed by Martin Pulvermann & Co., had a small pendant catch between the bifurcated arms of the cocking lever. The smoothbores generally had a lateral push-button on the air cylinder.

The pre-1914 Swift rifle, made by Kynoch to the patent of George Hookham, had an effective — if clumsy — double spring-catch at the juncture of the barrel block and air cylinder, while most Webley & Scott pistols, the first of which was designed by Douglas Johnstone and John Fearn in 1923, use an adaptation of the catch associated with the company's revolvers. The Weihrauch HW35 series has a small hooked lever protruding, a little awkwardly, from the left side of the barrel block in front of the barrel/receiver pivot, while the HW55 has a pivoting lever on the left side of the breech. The Anschütz LG335 originally had an inconvenient sliding thumb-operated catch under the barrel, but the 1979 version substituted an excellent 'clutch' lever of the type originally developed for the Walther LGV of 1963. Mayer & Grammelspacher Original Diana 65 and 66 recoilless target rifles have a spring-loaded lever on the left side of the barrel block, which holds the barrel tightly against the breech when locked down. Its spring flips it open after a mere jab with the thumb.

The advent of competition shooting has led to considerable developments in **trigger design**. Some nineteenth century gallery guns had highly sophisticated extra-sensitive hair-triggers, but sophistication was the exception rather than the byword prior to 1950; most guns simply had a trigger with a one-piece intermediate sear acting on the lower front edge of the piston face, or in a hole cut in the piston wall ('marginal piston release'). However, the trigger of the BSA Jeffries Pattern underlever rifles lay in a separate housing at the end of

the air cylinder, releasing the tail of the piston rod ('central release'). The Webley & Scott Mk 2 Service Rifle of 1933 also displayed some refinements and so, too, did some of the leading German makes.

The first postwar Weihrauch HW35, with its multi-lever Rekord trigger, and the Mayer & Grammelspacher ball-sear piston release system (originated c.1937) quickly showed what could be achieved. The sturdy parts of the BSA Airsporter trigger were anchored in a massive cast housing. Improvements to triggers continued through guns such as the Falke Modell 90 and the Walther LG55M and LGV, which were the finest target rifles made prior to the introduction of the recoilless types. The triggers of these recoilless rifles now represent the pinnacle of development, gained at a cost of considerable complexity. Most, however, are fully adjustable.

Unfortunately, many of the cheapest guns imported from Italy, Spain, the People's Republic of China and elsewhere still exhibit crudely made and poorly designed triggers; the Spanish El Gamo Expo 200 (ASI Sniper) and Norica 61-F, for example, have trigger levers acting directly on the piston. Most of the samples tested, therefore, exhibited a horrendous knuckle-whitening trigger pull that made accurate shooting very difficult. It is a shame that so little attention should be paid to the design of the piston assembly and trigger/piston release mechanism: they are the cornerstones of good design, and can easily negate good sights and well finished stocks.

Sights have also been transformed since the 1950s. Front sights have always been beads, blades or barley-corn (inverted V), mimicking cartridge guns, but many air rifles now sport sight hoods or removable-insert tunnel type sights providing a surprising variety of sight-pictures. These have become increasingly popular since the rise of competitive target shooting. Back sights, once simply open V or U notches, were quickly refined until lateral drift and elevation could be controlled. Vertical adjustments could be achieved simply by fitting a screw-elevated spring-leaf, and lateral alterations were made either by forcing or screwing the notch block across the leaf. Prewar BSA and Webley rifles may even occasionally be encountered with micro-adjustable peep sights. As competition became fiercer, micro-adjustable aperture back sights appeared on airguns; most German makers, for example, were offering good-quality diopter sights in the mid-1950s. The modern sights all differ, yet share the same basic features. Vertical and lateral adjustments are controlled by 'clicking' drum units in which small spring-loaded balls engage in seats milled in the drum edges. Several military-style peep sights, protected by a hood or in a housing, have appeared on guns such as the original Sussex Armoury Jackal. The simple, effective and sturdy Benjamin Bar-V — another manufacturer's answer to the problems of providing strong sights—uses an eccentric-cylinder elevating system.

Most air rifles are fitted with **rails or ramps** for telescope sights, though the curious variety of sight-rail widths often makes special mounts obligatory. Many manufacturers, including all the British ones, are content to mill shallow grooves in the air cylinder and make scant

provision for the arrester blocks essential to prevent sight-movement. Exceptions to this rule include BSF and Mayer & Grammelspacher, both of whom fit sturdy separate ramps, and Weihrauch, Feinwerkbau and others who fit locating holes or slots. Several simple projecting or reflecting sights have appeared recently, facilitating snap-shooting. The British BSA RS-1 and the American Weaver Qwik-Point collect and reflect ambient light, while the American Tasco-Rama and the Swedish Aimpoint are light-emitting diode types that appear to project aiming marks through the sight tube. The recently discontinued British Singlepoint, the sight that began the revolution, gives the illusion of projecting a red dot at the point where pellet impact will occur.

Automatic or manual **safety units** normally prevent piston release until the action is properly closed. Fritz Walther patented one such system in Germany in 1951, but some pre-1914 BSA Jeffries Pattern rifles, with S-prefix numbers, had been fitted with a double-bent piston rod safety design by George Norman in 1908. The Walthers – and the post-1979 Anschütz LG335 – have sliding plates under the receiver, which block the trigger lever once the barrel is depressed by more than 2-5° (depending on make). The Spanish Norica 80 and 80-G and the Mayer & Grammelspacher Original Diana 'S' series display similar fittings. In addition, virtually every reputedly-made sidelever-cocking gun – the recoilless patterns, the Webley Osprey, the Sussex Armoury Jackals and others – have safety interlocks preventing the lever closing the action accidentally. Serious injury could otherwise ensue. The BSA Buccaneer and Scorpion, the Slavia Tex 086, the FB Record LP77 and others are fitted with trigger safeties, while at least one system (Jacob Mayer's 1915 patent) completely isolated the cocking system from the trigger mechanism. The prewar Diana 58 embodied this separate-cocking design. Semi-automatic and manually-operated safety catches are found on the East German Haenels, the Czech Slavia 630 series, the modern Webleys and many American Benjamins, Crosmans and Daisies. Most of these are entirely independent of the cocking stroke, and lock the trigger only after cocking has occurred; the best is that of the perfected Mayer & Grammelspacher Original Diana 45 (not the first few guns), where the entire sleeve protrudes from the back of the air cylinder. Possibly derived from the Haenel or Slavia types, this applies itself automatically and must be reset before each shot. Such safeties, however, may prove irritating when the firer inevitably forgets to override the unit before pulling the trigger and 'misses' a shot. Detractors of safety features on airguns have always claimed that the automatic internal safety prevents de-cocking a rifle cocked in error, or after the escape of an animate target; these points are undeniably valid, but airgun safety is surely essential, even though the potential dangers are less than with cartridge guns. What should not be beyond the ingenuity of airgun designers is the development of an automatic safety with optional manual override.

Recoilless action has always been one of the few real advantages. Crosman, Benjamin, Smith & Wesson, Hämmerli, Daisy and other pneumatic and gas-powered guns had over spring-air types, even though the weight of

guns such as the Walther LG55M minimized the effects of recoil and spring-surge. In 1956, however, Kurt Giss perfected the first recoilless spring-air gun for Mayer & Grammelspacher, using a contra-piston assembly of two identical opposing pistons patented in Britain in 1958. This simple and effective system – suggested as early as 1902 by a Scotsman named James Picken – appeared on the Modell 6 target pistol and has since been widely used. The appearance of the Giss System caused several German companies to seek recoilless actions, though BSA and Webley & Scott also developed experimental rifles. Anschütz initially applied a pneumatic braking system to the LG220, designed by Helmut Liebmann in 1958 and patented in Germany in 1961, in which a short rear piston stroke balanced the larger front propulsive stroke. This was replaced on the LG250 by an essentially similar hydraulic brake developed in 1965–66 by Hermann Wild, in which recoil energy and spring-surge were absorbed by viscous hydraulic fluid seeping around a sub-diameter washer in rear piston chamber.

The barrel and receiver of the Feinwerkbau rifle, designed and patented by Karl Westinger, Ernst Altenburger and Edwin Wöhrstein in 1960–62, are suspended on roller bearings and run back on rails laid in the stock/frame sub-group – a system copied in the Korean Yew-Ha – which has achieved exceptional success at national and international competitions. The Walther single-stroke pneumatic air-compressing system was developed for the LP2 pistol in 1962–63 and finally perfected on the LGR rifle, which made its first appearance in 1974. It is by far the simplest, as only the trigger mechanism and the valve-actuating striker move on firing. Elegant and effective, it has proved to be worthy competition for the Feinwerkbau. The Daisy Powerline 717 and 722, and the new IGI CU400 target pistol, are single-stroke pneumatics. The El Gamo Statical has an inferior variation of the Feinwerkbau 'Sledge' system and the little-seen Haenel-Thälmann 3.121 apparently uses a compressible synthetic buffer.

Few manufacturing or sales gimmicks have had lasting effect on airgun technology. They include **shot counters**, patented for the Giffard gas-powered gun as early as 1891, and also fitted to the Original Diana Modell 30 BB gun. Several guns have been made with **quick-detachable barrels**, including the Webley & Scott Mk 2 Service rifle (1933) – barrels were available in 0.177, 0.22 and 0.25in – and, more recently, the Italian Marocchi rifle-shotguns and the Webley Hawks Mk 1 and 2. The cam-locked Hawk barrels could be exchanged very rapidly, but the interesting experiment met an untimely demise when only 20 per cent of the purchasers acquired both barrels. Readily detachable barrels may yet reappear to help companies such as Manchester Air Guns, currently offering the 'Mercury Magnum' (the standard BSA Mercury Mk 3) with barrels of 0.177, 0.20, 0.22 and 0.25in.

Many American BB guns made by Daisy, Markham and others have had tube **magazines**, and the American inventor Charles Bunge patented a revolving magazine in 1869. Pan magazines were developed in Britain by Clark & Butler (1906) and Joseph Cox (1907); Cox's magazine is sometimes said to have been licensed to Haenel prior to

1914, but the company concerned is now believed to have been BSA, even though some later Haenels used it. Hugo Schmeisser perfected a detachable box magazine for the Haenel Sportmodell (1933), which is now used only by the Anschütz LG275.

The Spanish El Gamo Expomatic and Gamatic (AS1 Sniper and Paratrooper Repeaters) – and a Telly rifle of the late 1960s – may be encountered with pellet tubes above the air chamber. A carrier block transfers pellets to the breech during the cocking stroke, but achieves satisfactory operation at the expense of some pellet damage. Crosman has advertised Pell-Clip clip-loaded box magazines, while Daisy, after experimenting with the Rota-Clip, has developed a harmonica-like magazine strip for the latest Powerline guns. There are also **quick-loaders**, such as those developed in Britain by Lane Brothers and now marketed by the Sussex Armoury – comprising a self-adhesive plastic strip in which pellet-carrying inserts can be fitted, and an excellent drum-type dispenser with a clear plastic cover.

Sling swivels may be found on many air guns, though fitting them to the barrel or barrel-block of break-action guns places unnecessary stress on the lock. The Chinese Industry Brand Models 55 Super Hunter, 61 Hunter and B-45-3 Lion, widely distributed in Britain by Abbey Supply Co. and the Sussex Armoury, have side-mounted swivels; and the introduction of sidelever rifles such as the Webley Osprey, Sussex Armoury Jackal and the Hämmerli permits swivels to be placed underneath the fore-end and on the under-edge of the butt.

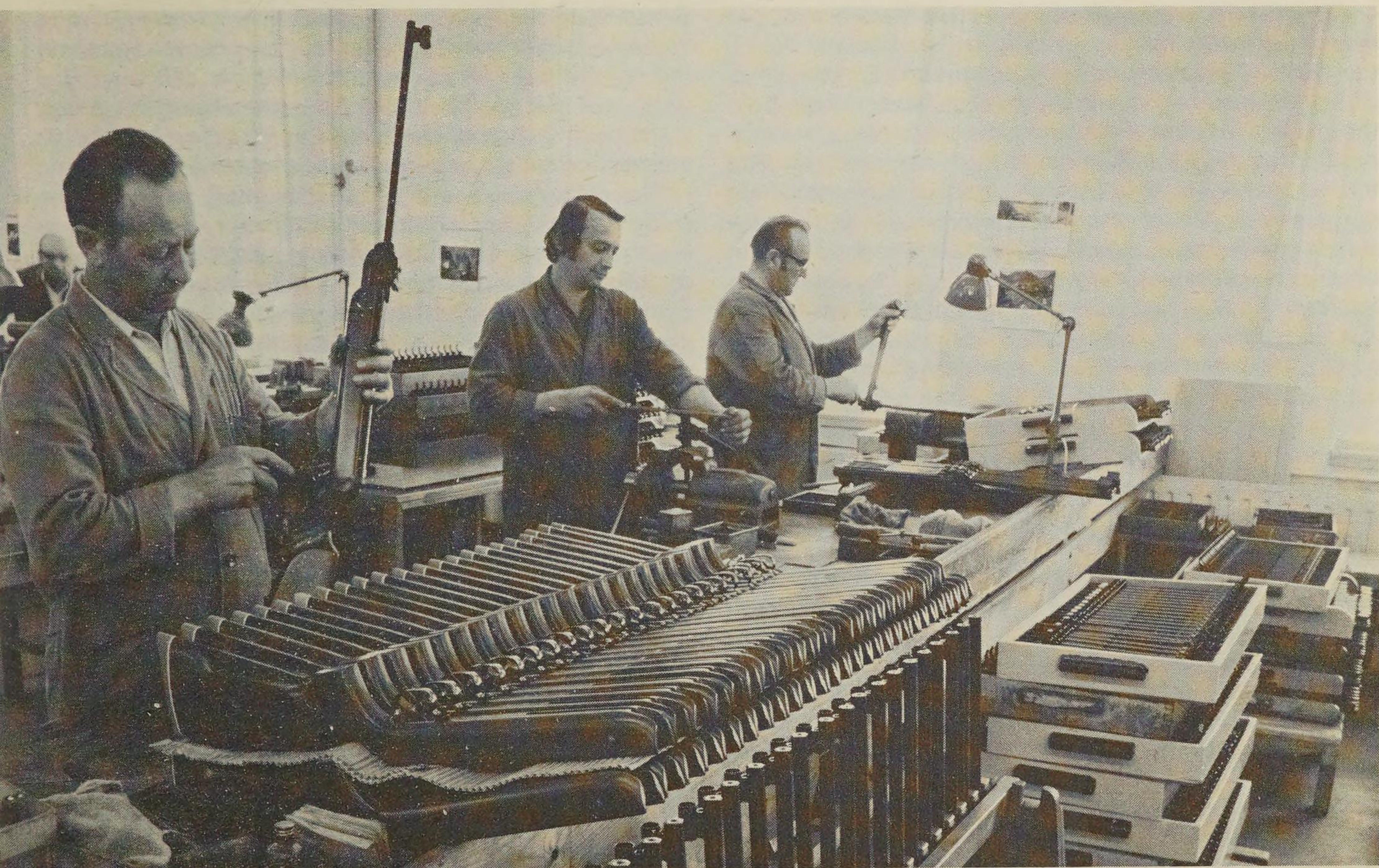
Additional **barrel weights**, generally over-size barrel sleeves, may be obtained with the Original Diana 66, Weihrauch HW55 and other match rifles, while some older Hämmerli designs had an additional 'weight bar' beneath their barrels.

TRENDS IN DESIGN AND MANUFACTURE

European **research and development** during the past twenty years has been largely geared to top-grade target rifles, while American efforts, by and large, have been directed towards better and cheaper children's guns. Immeasurable progress has been made in both areas, and the European developments have also been reflected in some of the lower price brackets. It is especially evident in the design of sights, and even the El Gamo Expo, the Norica 61-C and other cheap designs display micro-adjustable patterns formerly restricted to leading target rifles. However, few inexpensive guns exhibit mechanical improvements, and their basic design has remained substantially unchanged since 1950, even though the development of synthetic breech and piston seals has improved reliability. The BSA Meteor has the Power Seal piston assembly and the Webley Hawks and Ospreys have self-lubricating copper-impregnated PTFE piston rings, but these are exceptions to the rule.

Right, some of the later stages in modern airgun manufacture: left, assembling the air-cylinder and trigger mechanism (Anschütz); opposite page, top, assembling Original Diana 35 rifles (Mayer & Grammelspacher); opposite page, bottom, sighting-in (Mayer & Grammelspacher).





An appreciable amount of money has been invested in **design, advertising and packaging**, particularly during the 1970s when manufacturers began to realize the value of market research. Their approaches have varied, from the elegant professionally-executed advertising material typified by BSA, Webley, Walther, Feinwerkbau and others, to the often less sophisticated but no less efficient aggressive styles of the Sussex Armoury and Daisy. British guns have almost always been good value, incorporating many excellent mechanical characteristics, but the industry has paid little attention to the trigger guards, often regarded spacers and ventilated rubber recoil pads as gimmicks, and failed to introduce improvements until advances elsewhere left no alternative. There has also been widespread reluctance to provide aperture sights, arrester blocks for telescope sights and adequate sight pictures. British industry is now shaking off some of its lethargy and cannot be faulted for the quality of its packing. All four principal manufacturers now use similar expanded polystyrene trays and provide a number of accessories. This is an area in which many Continental rivals could learn a few lessons, as many expensive German guns come in flimsy cardboard boxes. However, British manufacturers failed to develop a recoilless rifle when the chance was offered, perhaps misjudging the rapidity with which the leading German guns were accepted, even for bell-ringing target shooting, and the market has been surrendered to Anschütz, Mayer & Grammelspacher, Walther, and Westinger & Altenburger. The Webley Osprey Supertarget, though among the best of the non-recoilless target rifles, found itself outclassed at the highest levels almost as soon as it had appeared.

Many manufacturers naturally wish to emphasize the origin of their products and many guns display prominently their designations or maker's name on top of the air cylinder. Many of these marks are applied in gold paint, which looks very poor when it begins to wear. The same criticism applies to the paint and transfer-type decoration associated with some American Daisies, and plain blind-stamped unobtrusive marks are usually preferable. An exception to this may be made for the delicate gold-lined Mayer & Grammelspacher Original and Diana trademarks, regrettably discontinued at the end of 1979.

The last few decades have brought a continuous **deterioration in materials** and construction in many industries, and gunmakers have been forced to depart from traditional craftsmanship because of spiralling costs and rapidly increasing wages in what was once a labour-intensive occupation. Consequently, widespread introduction of automation and alloy and synthetic parts has been encouraged. Though this process is often vigorously criticized, some alloy and polymer parts are actually stronger and more durable than the gunmetal originals.

Barrel and locking-system construction has seen few particularly radical revisions, despite the refinement of manufacturing techniques to include cold forming of rifling and extrusion of air cylinders. BSA, for example, has patented single-piece air cylinder and barrel-housing units and now fits an extruded cylinder to the Airsporter

S, applying no heat to the barrel or receiver during assembly. Few new locking systems have appeared during the last decade, and most guns still display a version of the original Mayer & Grammelspacher spring-loaded ball or bolt detent lock, though a few positive or actively-locked airguns may also be obtained.

The **air cylinder and piston assembly** is one of the most vital features of airgun design but, oddly, one in which there has been little advance. BSA's 1948-vintage Airsporter originally had an efficient but expensive conical-head piston, which, regrettably, has now been superseded by the Power Seal floating-head piston – an efficient design but probably not as good as its predecessor. Webley & Scott, after developing a copper-impregnated PTFE (Polytetrafluoroethylene) piston ring seal for the Hawk and Osprey, obtained a provisional patent for a seal in which a neoprene O-ring forces a PTFE washer out against the cylinder bore, braking the piston at the end of its travel. However, apart from the BSAs, Webleys and the principal recoilless rifles, few other types display any particular effort to seal breeches and pistons. The synthetic O-ring breech seal (Weihrauch and some others still use leather seals) is almost universally used in break-barrel guns, but too many makers still unquestioningly bolt leather washers to the piston head. Poor sealing and inferior mainspring tempering leads to poor velocity maintenance, and the performance of a gun may not always match the capabilities of its sophisticated-looking sights.

The development of **air-tight valves and air reservoirs** has always presented the makers of pneumatic and gas-powered guns with serious problems, though research during the last twenty years has resulted in virtually leakproof systems. Much of the credit belongs to Crosman in the USA, and Hämmerli and Walther in Europe. The constant-power gas metering system of the Hämmerli 452 Single and 454 Master is particularly impressive, and the valving arrangements of the Walther pneumatics, after many development problems, have been demonstrating their efficiency since the 1960s.

Trigger units and trigger-guard design have also been subjected to experimentation. In addition to design changes, many manufacturers have attempted to simplify and 'package' trigger components in easily-removable sub-assemblies, greatly facilitating dismantling and reassembly. Trigger levers and other components are now often synthetic; some, for example, are nylon, while other manufacturers use durable plastic. Exerting pressure on some of these triggers is disconcerting when the guns are not cocked, but the bend, fortunately, does not become permanent.

The traditional cast or forged **trigger guard** is awkward to machine accurately, and so, as it receives many unavoidable knocks, many manufacturers now fit cheap injection-moulded ABS (Acrylonitrile-Butadiene-Styrene) or similar polymer guards. It is usually concluded that these cheapen the look of a gun, but a sturdy moulded guard generally looks neater than a simple stamped strip though they are sometimes ill-suited to field or hunting use. A few guns still display the traditional cast or machined guard, including the BSA Mercury and Airsporter, while Anschütz has recently introduced an

attractive one for the LG335, very much against the trend.

Many components of lower-priced **sight** designs—slide blocks, control discs, sometimes even the entire sight—are now made of plastic; this is not especially objectionable provided the sights are well protected, particularly if a reasonably good sight-system is used on a cheap gun. Some BSA sights are made of an exceptionally strong polymer called Kemetal, indistinguishable at a glance from metal alloy.

Design of **stock and fittings** has been geared to simplification and, therefore, to reduce time spent on hand finishing. Hand chequering has been replaced by rolled-in 'chequering' or a stippling process; and while wood remains the favoured material, stable warp-resistant plastic substitutes—developed through the efforts of Daisy and other American manufacturers during the 1950s—are seen in ever increasing quantities on cheap BB guns, pseudo-military airguns made by Hämmerli and the Sussex Armoury, the BSA Buccaneer and many pistols. Wood is comparatively expensive and more difficult to finish than an injection moulding, but Arizmendi, El Gamo and others fit beechwood stocks to even the lowest priced guns in their ranges, though oil-rubbing has been replaced by resilient polyurethane varnish, acrylic melamine and similar synthetic material. The principal objection to plastic stocks is their often shoddy appearance, though the attractive satin-finish brown ABS 'woodwork' made by TI Plasro for the Milbro G5 Cougar is a notable exception. A few companies still provide stocks of the highest quality, though many subcontract work to Sile SPA of Brescia, including Anschütz, Sussex Armoury, Mayer & Grammelspacher, and, until recently, BSA and Webley. Apart from the four principal manufacturers of recoilless guns—Anschütz, Mayer & Grammelspacher, Walther and Westinger & Altenburger—the deluxe products of BSA, BSF and Weihrauch deserve special praise.

Properly executed 'hot' blueing, still the best **finish**, is not a simple process and chemically applied 'cold' gun blues are rarely as durable. Airguns, therefore, have exhibited electrostatic paint finish (some Daisies), stove-enamelling (BSA and others), baked-on epoxy coatings (Milbro Dianas) and an assortment of proprietary finishes. Modern BSA rifles have blued barrels and chemically blacked receivers, though stove-enamelling may be encountered on the trigger-guard block. Many of the chemical finishes are hard wearing and chip resistant, but the same cannot be said of some paints.

Quality control, an indispensable part of airgun manufacture, may be conveniently subdivided into functioning tests and examination of workmanship, assembly and finish. The leading companies take great care to test-fire their guns and may even provide a test target with each one, a highly commendable means of preventing too many 'rogue' guns reaching the market. The task of airgun exporters is often complicated by differing national power restrictions, which places more emphasis on good quality control; otherwise, consignments of illegal guns could be delivered in error. Some of the lesser manufacturers apply less exacting standards, and small batches of inferior guns are occasionally distributed elsewhere by intermediaries who

fail to point out the defects; the reputations of these makes consequently suffer as the guns are gradually discovered. Increased enthusiasm, and the development of cheap testing systems, has made 'dumping' risky. However, problems are encountered in every manufacturing process and a small percentage of inferior guns inevitably escapes even the best organized control system. Final inspection varies from company to company. Parts may easily be gauged against master patterns, but judging the acceptability of surface finish applied to an invisible internal component—whose function is unaffected by casting flash or tool marks—is much more difficult and, as a result, often ignored. Cheap guns often display roughly-bored air cylinders, burrs on the cocking lever slot, poorly lubricated washers, shoddy internal finish, and screws protruding through the walls of an externally well finished but roughly inletted stock.

Guns made by the leading European manufacturers are of good quality: the greater their cost, the better the attention to detail. Little fault may be found with the leading recoilless target rifles, even though Walther initially fitted the LGR with a fragile plastic cocking lever knob. Most American makers may be similarly commended, despite the bulk of Benjamin, Crosman, Daisy and other patterns—intended for the home market—being usually of significantly cheaper construction, poorer quality and with more synthetic components than commonly encountered in Europe. However, this simply reflects on a very cost-conscious market where, until recently, airguns were regarded as toys. The design of many Daisy and Crosman guns is the equal of anything European, in spite of self-evident production shortcuts, while the Sheridans display good finish and American walnut stocks.

PERFORMANCE AND BALLISTICS

An explanation of how the data featured in this book have been interpreted must begin with an acknowledgement that two successive pellets fired from the same airgun inevitably arrive in different places on the target. The ballistics of diabolo pellets are still very poorly documented despite increasing research, and an authoritative study is badly needed; unfortunately, few people have access to the requisite laboratory facilities. A start should be made by examining *The Air Gun from Trigger to Muzzle* by Cardew, Cardew & Elsom (published in 1976 by Cardew Air Rifle Development), the only study of airgun ballistics yet published. However, this book has been soundly criticized in some sections of the airgun press, and describes hardly more than a series of interesting subjective experiments with little apparent bearing on 'real' airguns. There is, however, not much else to study in the way of literature.

The power of every airgun varies from shot to shot, which even applies to the Walther LGR and the Feinwerkbau 300S though good construction generally minimizes the effects. Unfortunately, a well-rifled and impeccably made rifle may still shoot noticeably badly with unsuitable pellets, while one of apparently inferior workmanship may shoot with extraordinary consistency. However, the majority of the products of manufacturers

with good quality-control will always be better than cheaper lines.

The **piston, mainspring and air-transfer port** assembly probably has the greatest influence on the consistency of velocity and potential accuracy. Researchers earlier in the twentieth century believed that a slow heavy piston — with its considerable momentum — was preferable, but more recent work has indicated that faster moving lightweight alloy pistons give commensurately greater velocities. The optimum weight distribution remains in dispute. The piston head shape and the corresponding internal surface at the front end of the air cylinder have not been subjected to much development, as most companies simply square them off in relation to the bore axis; BSA incorporated a conical piston head and breech-seat in early Airsporters but subsequently developed the simpler and easier-made Power Seal pattern. It is probable that the original system, which tended to funnel air into the transfer port, reduced the rebound effect as the piston braked against the compressed air in the front of the air cylinder and also minimized turbulence around the transfer port—improvements which, if *The Air Gun from Trigger to Muzzle* is accurate, may account for a quarter of total energy losses. (Though acknowledging the theoretical superiority of the original system, W. H. B. Smith, writing in 1957, believed that improvements were not evident in practice.) Standard pistons rebound from the air column near the end of their stroke, but are then pushed back towards the transfer port by the mainspring. The ensuing secondary propulsive impulse will affect velocity if the pellet is still travelling along the bore. Space between the piston head and the cylinder-end, plus the volume of the air port, can affect the compression ratio and gun power. Underlever designs with rotary loading taps often have short transfer ports and greater potential power, and Webley's designers found that the compression ratio of the Hawk could be reduced to meet the German 7.5J power restriction simply by boring a chamber in the piston head. The existing mainspring assembly could then be retained.

The most common **piston seal** is a well-lubricated supple leather washer, which acts radially towards the cylinder bore-wall as the piston travels towards the transfer port. A leaking piston or valve seal, common in early pneumatics, greatly degrades performance and many improvements have been attempted. However, many manufacturers still use leather washers, as synthetic materials initially failed to achieve ideal combinations of efficiency and longevity. The BSA Power Seal piston unit has a floating or buffered head carrying the neoprene O-ring seal, while Webley, not content with the Hawk/Osprey self-lubricating copper-impregnated PTFE piston rings, has now devised a seal in which a neoprene O-ring and a PTFE washer combine for maximum effect. It is claimed that this seal, after a single 'dry firing' without a pellet in the breech, moulds itself to the air chamber and does not need the lengthy shooting-in period associated with other airguns. Experiments with one Vulcan rifle suggest that this is not wholly true, but that the system does settle down more quickly than most other designs. The Anschütz LG250 and the Feinwerkbau

recoilless airguns display impeccably machined steel piston rings, while the Original Dianas have self-lubricating PTFE washers.

The **mainspring** is vitally important to the maintenance of velocity; it must develop consistent power from shot to shot, and the gradual but inevitable weakening must be imperceptible. Some manufacturers use concentric springs while others fit multiple spring assemblies, but much ultimately depends on the quality of the springs rather than the type. Counter-wound springs — one rotating clockwise, the other anti-clockwise — eliminate the tendency for a single spring to rotate the piston. Lateral distortion of the springs during compression is avoided in the best airguns by guide rods attached to the piston body or bearing against the mainspring block.

The **transfer or air port** connects the barrel and the air cylinder, and is obviously essential; its shape has an important effect on velocity generation, and its diameter should not exceed that of the bore. Power is lost if it inhibits transfer of air from the cylinder to the barrel, or if it lowers the compression ratio. The optimum port size depends very largely on the other features, such as compression ratio, port-length and volume and amount of turbulence towards the end of the piston stroke. The relation of the port to the major axis of the piston may also be important, but most manufacturers simply bore it as a cylindrical sub-diameter axial prolongation of the barrel. The take-off point, therefore, lies towards the top of the air cylinder rather than its axis, and virtually every manufacturer may be degrading the performance of his rifles by poor port position.

Leaks in the **breech seal** or loading port may also occur, though the widespread use of neoprene O-ring washers has minimized the problem in break-barrel systems, and some cam-lever devices retract the barrel into the barrel block as final closure occurs. The lateral loading plugs or taps associated with BSA and other underlever or sidelever-cocking rifles are more difficult to seal owing to the large contact surfaces between the plug body and its seat. The modern El Gamo Center pistol has an ingenious floating loading port but most alternative designs have been failures.

The pellet is 'started' into the rifling by rapidly increasing air pressure, expending energy overcoming friction, and more energy loss is contributed by the shape of the **chamber lip**; the Cardews' book suggests that small-scale radiussing (rounding) gives the best performance and that most other shapes are inferior. In addition, a pellet may occasionally seat at an angle to the bore axis, and velocity and accuracy consequently suffer. Seating pellets with a manually-operated pusher sometimes eliminates this problem and may even increase velocity by allowing a better balance of frictional resistance and propulsive force.

The profile and design of **rifling**, the depth of the grooves and the proportion of grooves to lands also exert an effect. Most makers have settled on 8-, 10- or 12-groove twist with a pitch of one turn in 30–45cm (12–18in), either for convenience or to standardize production machinery. Many barrels are in fact made by the same subcontractors, which explains numerous apparent similarities. Attempts have rarely been made to

match the velocity range of pellets with rifling pitch, even though target rifles may operate at 200–250fs (60–76ms) less than sporting guns. Most share similar pitch-twist, with consequent differences in rotational velocity, gyro-stability and accuracy of the projectiles. Different velocity ranges and differently-shaped projectiles may well require different rifling pitches for optimum performance, which partly explains why the performance of pellets may vary from gun-make to gun-make. Bore, groove and land diameter can also have considerable effect on velocity, velocity maintenance and ultimate accuracy. Many articles in airgun magazines have tried to prove that certain brands of pellet were best in certain makes of gun. Such claims are usually highly questionable but, occasionally, general conclusions may be justifiably drawn. All too often, however, the tests prove only that a single gun of a particular make shot best on a solitary occasion with an isolated batch (NOT brand) of pellet. It is misleading to draw wide-ranging inferences from these; most manufacturers permit bore diameter to vary within limits which, although very small, may make gun 10001 shoot well with Brand 'X' pellets whereas 10002 may fare better with Brand 'Y'. Moreover, the magnitude of variation often depends entirely on arbitrary limits set by the manufacturer; the velocity of the BSA Meteor may vary between 500 and 612fs in 0.22in calibre, while the Airsporter-S is restricted to 600–612fs. Several

experiments have been undertaken to investigate the performance of supposedly similar guns, and the variation to be expected from typical results may be summarized as shown in the table 'BSA factory trials'.

BSA factory trials

Guns: BSA Mercuries Mk 3. Pellets: BSA Pylarm, put through a sizing dye before chambering.

Tester: R. Evans, July 1980.

4.5mm/0.177in calibre.

Gun	1	2	3	4	5
Diameter (in)					
bore	0.1770	0.1775	0.1775	0.1770	0.1765
groove	0.1830	0.1830	0.1840	0.1830	0.1825
Velocity (fs)					
average	793	797	796	806	790
maximum	797	800	803	813	799
minimum	785	793	801	801	781
Greatest difference between shots	10	5	7	6	10
Velocity deviation limit (%)	0.38	0.20	0.35	0.35	0.58

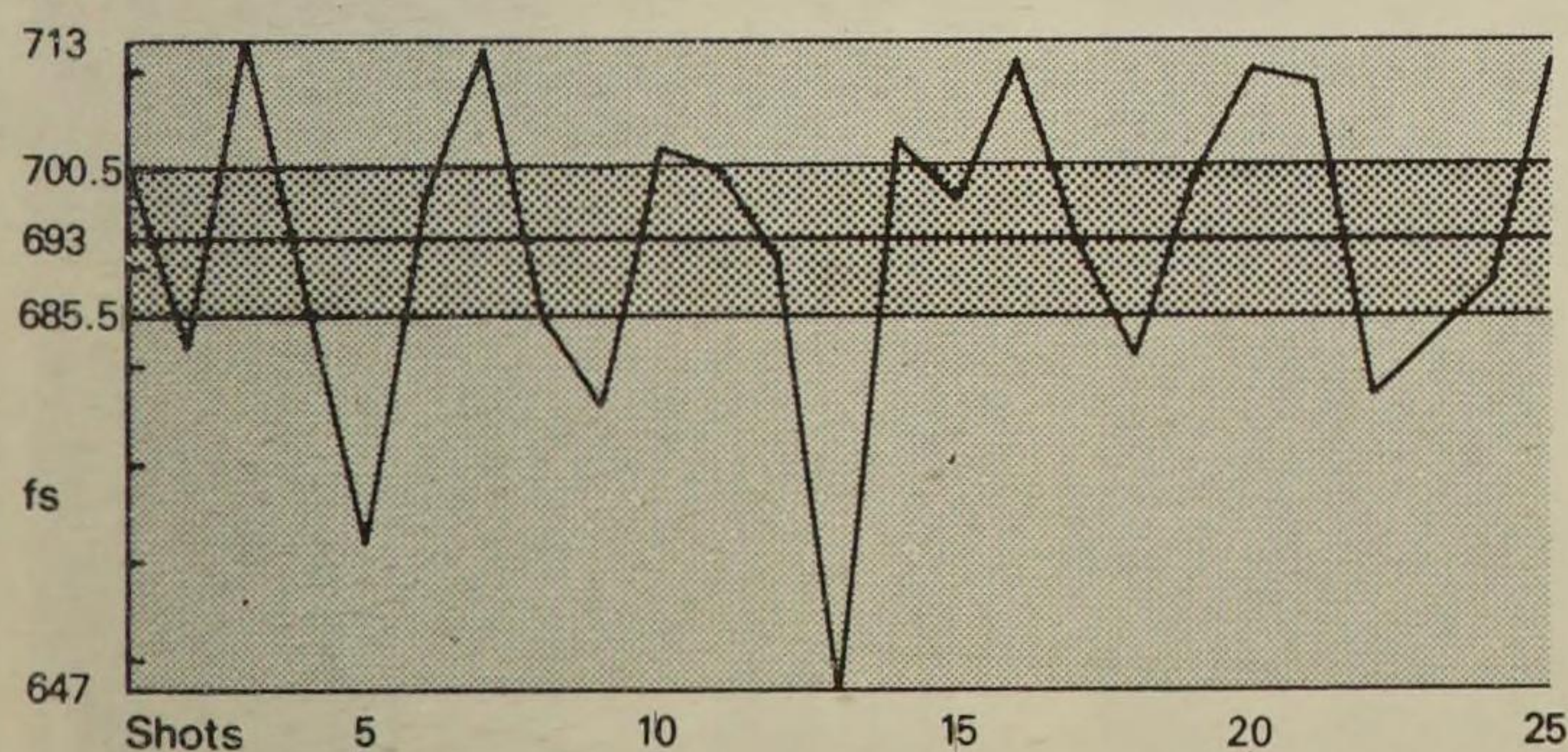
5.5mm/0.22in calibre

Gun	1	2	3	4	5
Diameter (in)					
bore	0.2170	0.2170	0.2170	0.2170	0.2175
groove	0.2230	0.2235	0.2245	0.2245	0.2245
Velocity (fs)					
average	588	599	599	589	586
maximum	594	607	606	596	591
minimum	582	593	589	583	579
Greatest difference between shots	7	10	14	7	11
Velocity deviation limit (%)	0.48	0.50	0.60	0.53	0.55

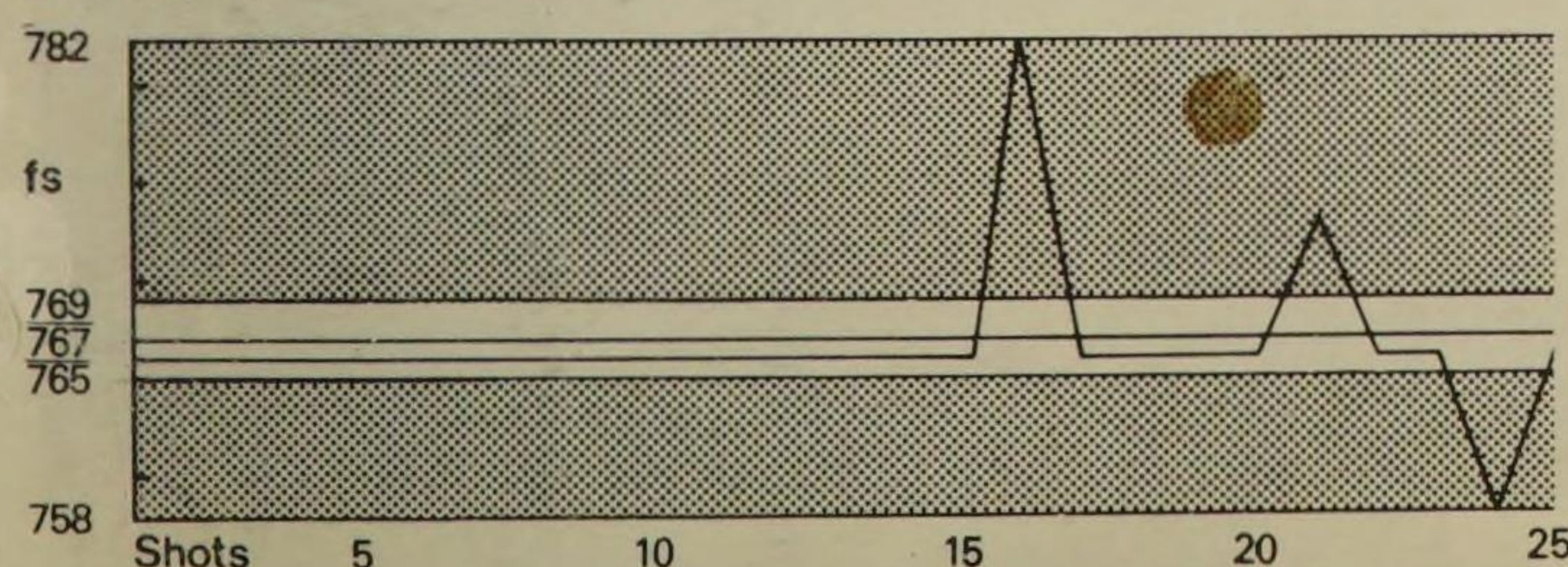
The effects of using unsuitable pellets

A BSA Mercury Mk 3 (R2), loaned by its manufacturer, was fired with Eley Wasp pellets – recommended as ideal by BSA – and with Lanes' Beattall, which were very loose in the bore. The results were:

Mercury Mk 3 (4.5mm/0.177in) Lanes Beattall: VDL 2.13%, GD 56.



Mercury Mk 3 (4.5mm/0.177in) Eley Wasp seated to 2mm: VDL 0.46%, GD 16.



The sample of Beattall pellets had a very small skirt diameter (0.179in) compared with 0.187in for the Wasp, though the heads were much the same: 0.176 and 0.177in respectively.

Control tests

Tester: J. Walter, May – June 1980

Using pellets straight from the tin, no sizing or seating

Gun	1	2
Calibre	4.5mm/ 0.177in	5.5mm/ 0.22in
Velocity (fs)		
average	761	549
maximum	773	569
minimum	751	530
Greatest difference between shots	12	25
Velocity deviation limit (%)	0.62	1.41

Using pellets seated 2mm in the bore

Gun	1	2
Calibre	4.5mm/ 0.177in	5.5mm/ 0.22in
Velocity (fs)		
average	767	569
maximum	782	583
minimum	758	558
Greatest difference between shots	16	17
Velocity deviation limit (%)	0.46	0.81

Too long a barrel can actually restrict performance, as there is very little propulsive force accelerating the pellet once it has travelled through 5–6in (13–15cm) and friction in a long bore may actually retard progress. At least one trial has shown that 4.5mm/0.177in pellets leave the barrel of a standard Weihrauch HW35 at a higher velocity than the longer-barrelled export version, and the Sussex Armoury Jackal AR7, which has an 8in (20cm) barrel, possesses much the same accuracy and velocity as the 15in (38cm) barrelled Hi-Power type. (The experiment with the HW35 and HW35E is subjective and the result may not be true of all Weihrauch guns of these types.)

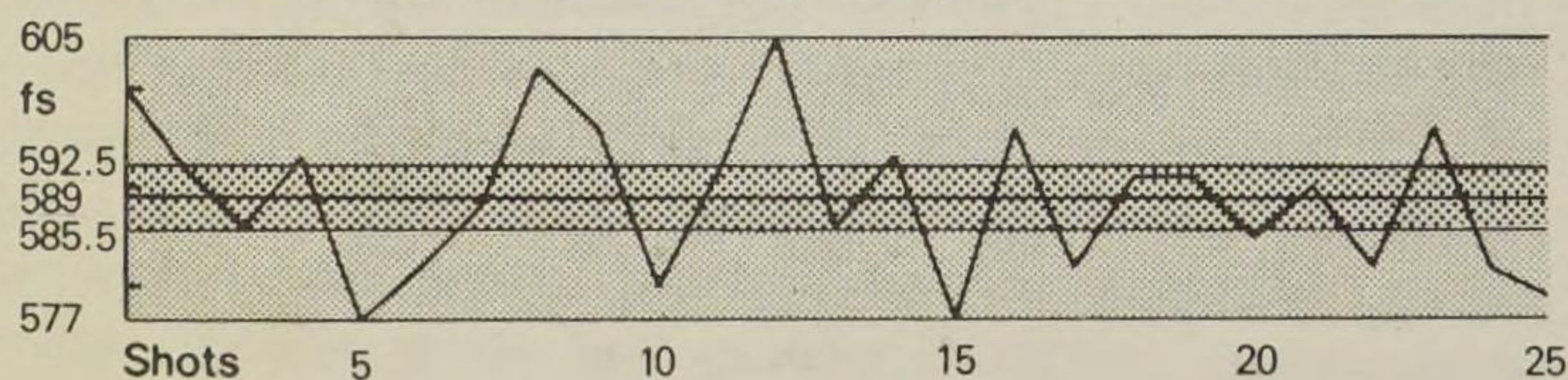
In addition to variables contributing towards variations in the mechanical performance of the gun – many acting in opposition rather than cumulatively – problems of **pellet design** remain. A single tin of pellets may exhibit variations in weight and head/skirt diameter as great as 2 per cent, with a proportionate variation in contact area between the bore and the pellet. The resulting changes in friction – even disregarding weight variations – influences the velocity the pellet subsequently attains.

The head/skirt diameter is probably the greatest single influencing factor in the performance of unsized pellets, greater even than comparable fluctuations in weight. If there is much deviation in the concentricity of head and skirt, asymmetric frictional forces will act at the contact areas and the axis of the pellet may emerge from the muzzle angled to the axis of the bore or flight path. Air resistance and air-flow over the pellet's head will tend to deflect it further, though a round or flatheaded pellet usually maintains its course better than the pointed variety. The consistency of the thickness of the skirt wall influences the way in which a pellet fits the rifling and, therefore, how it subsequently emerges from the muzzle. A thin wall engraves better in the rifling grooves than a thick one, but too thin a wall may split and leak air. The design of the pellet skirt – some are ribbed, others smooth – and the pellet length are other factors that pellet makers and gun designers consider. Some pellets, for example, seat on their multi-flange heads rather than their skirts: the Japanese Silver Jet and its original British prototype, Lanes' Triumph, are among them.

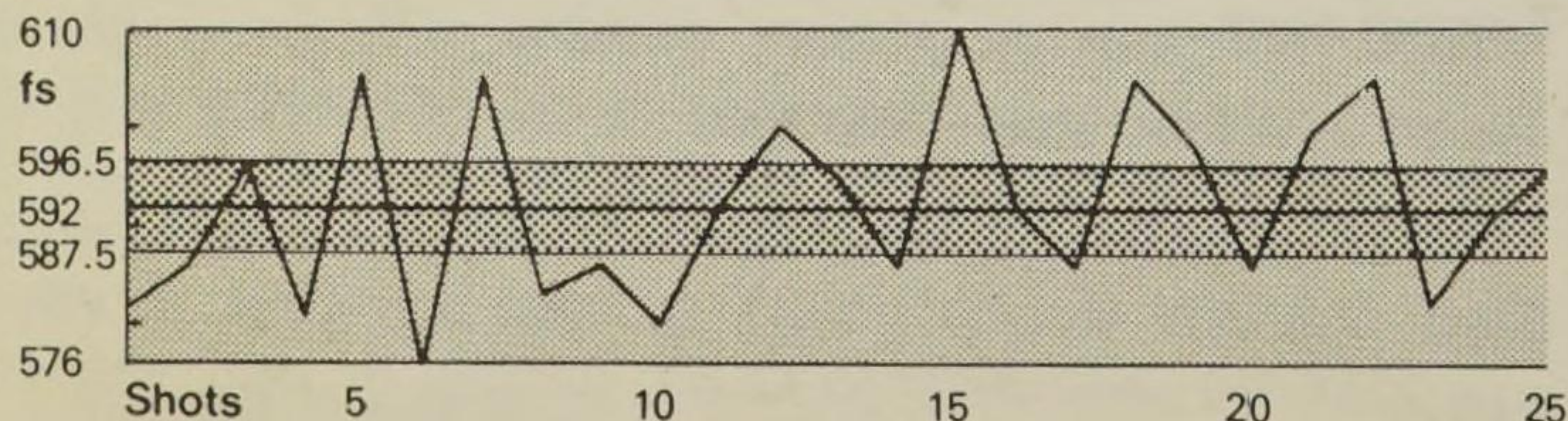
The effects of barrel length on performance

This trial was undertaken with three Jackal rifles, to investigate whether their maker's claim that the short-barrelled AR7 performed similarly to its longer-barrelled relations was justified. The results were obtained from a Skan Chronoscope.

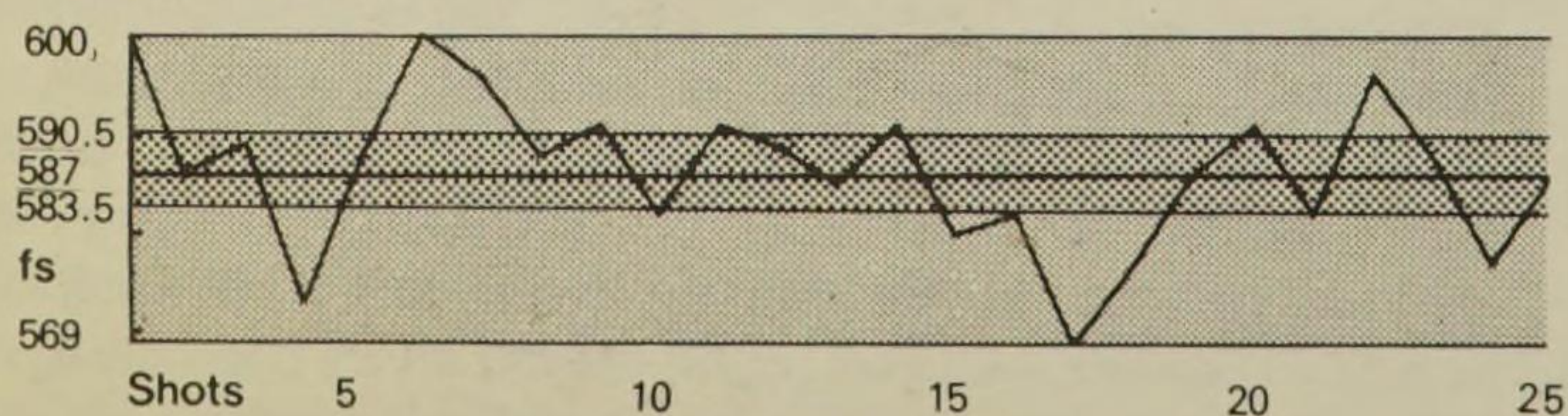
Jackal AR7 (5.5mm/0.22in) Eley Wasp: VDL 1.20%, GD 19.



Jackal Hi-Power (5.5mm/0.22in) Eley Wasp: VDL 1.47%, GD 29.



Jackal Hi-Power Woodstock (5.5mm/0.22in) Eley Wasp: VDL 1.20%, GD 16.

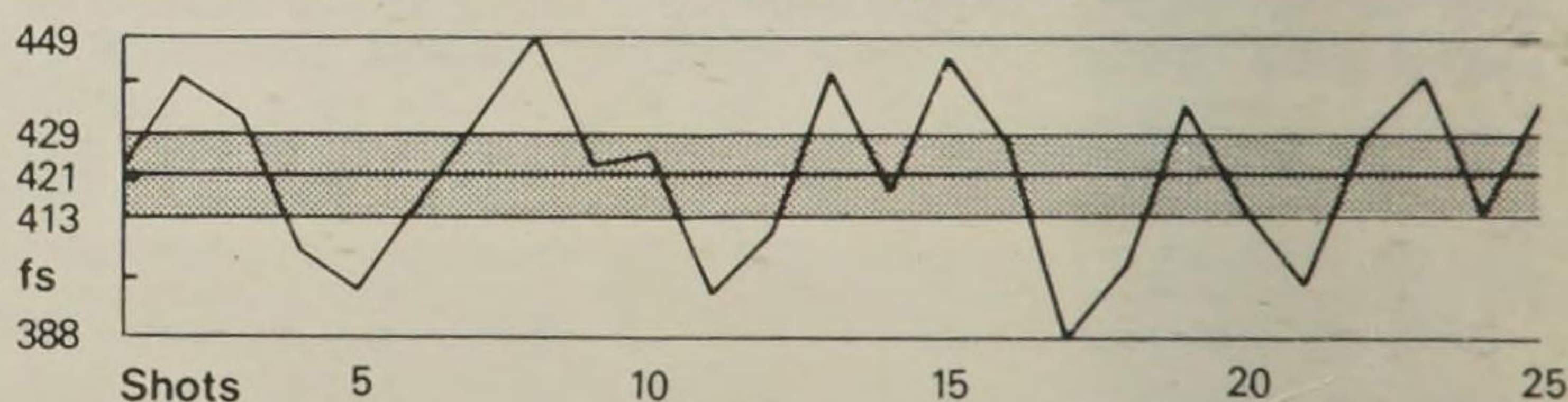


The performance of the three guns proved to be virtually identical, as no detectable differences in accuracy potential could be obtained. The AR7, however, had a rather harsher muzzle blast and took some getting used to.

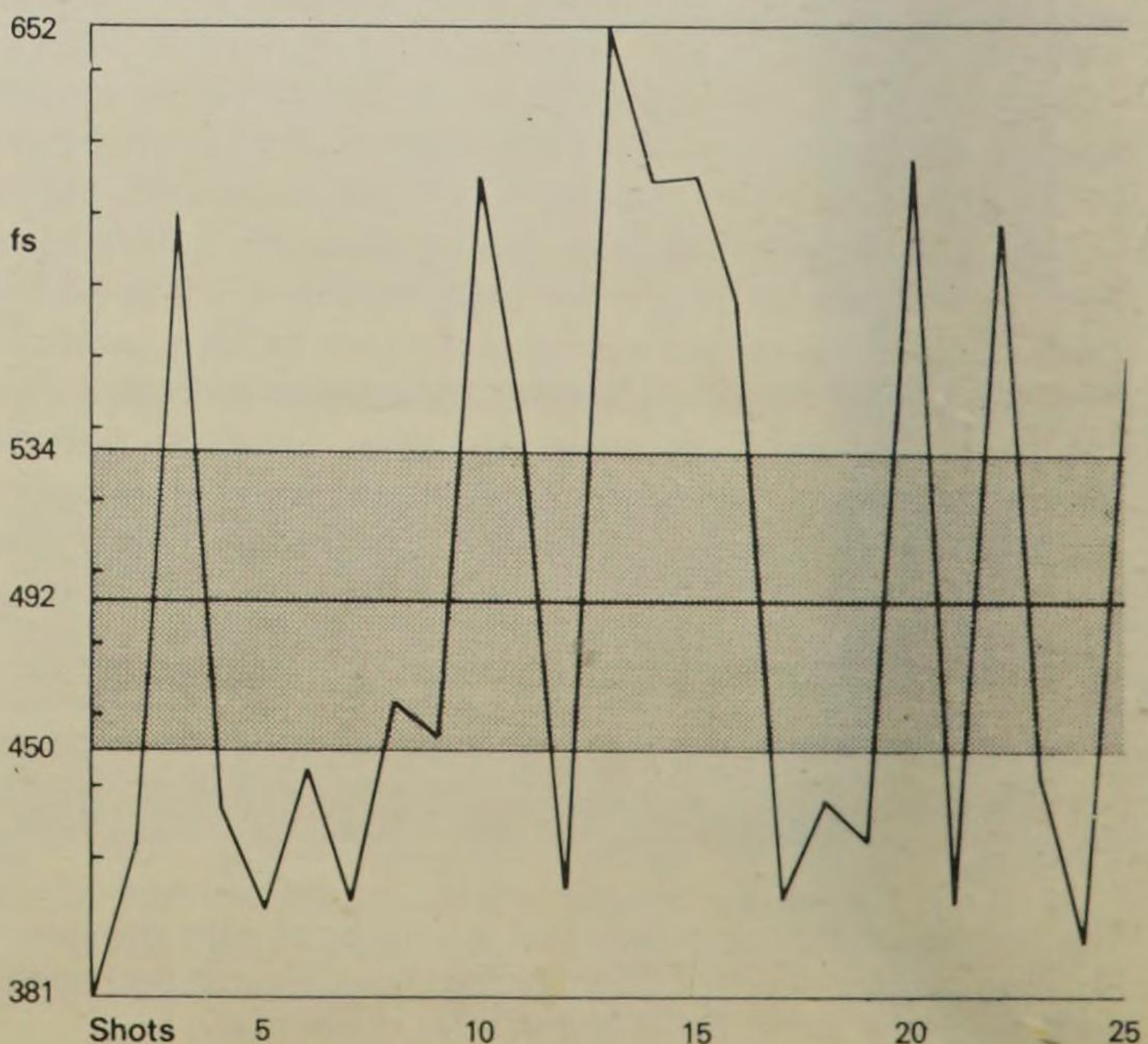
The effects of dieselling

This trial was undertaken with an old El Gamo Expo 200 (ASI Rangemaster), which had been sufficiently used to be of relatively little value yet was strong enough to withstand the additional pressures generated by compression-ignition of the unsuitable oil (3-in-1) added to the air cylinder. The 5.5mm/0.22in RWS Hobby pellets were supplied by Leslie Hewett Ltd, and the testing undertaken in conjunction with a Skan Chronoscope.

El Gamo Expo (normal): VDL 3.66%, GD 39.



El Gamo Expo (treated): VDL 16.81%, GD 240.



Lubrication often has a startling effect on muzzle velocity, but can also bring serious problems. Only about 30 per cent of the available mainspring energy is transmitted to the airgun projectile, while a similar amount simply disappears overcoming friction. A decrease in frictional resistance usually brings increased performance, and may be obtained by treating the piston washer with silicon oil or other proprietary lubricant, while the mainspring can be coated with molybdenum-containing grease. However, care must be taken to select a lubricant with a suitably high flashpoint (temperatures as high as 1,000°C may be generated during the firing cycle), otherwise the virtually uncontrollable phenomenon of dieselling occurs as a result of compression-ignition of the vapourized lubricant in the air chamber.

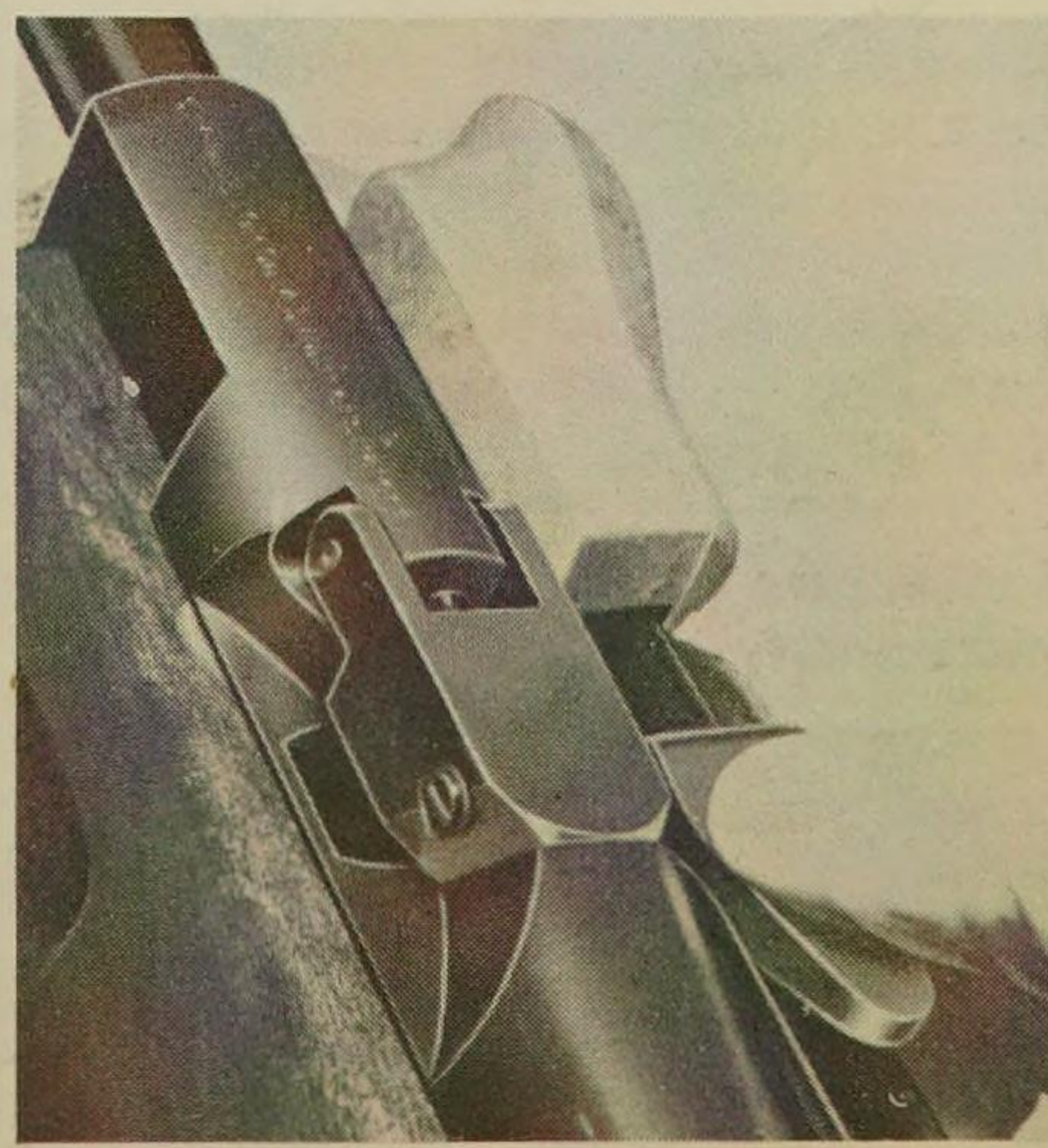
The air cylinder bore is often rather rough in low-cost guns and burrs may be present on the edges of the cocking lever slot, but by mirror-polishing the contact surfaces of the piston head and the interior of the cylinder such irregularities may be removed. The results of re-finishing and lubricating a gun are often very impressive.

Unfortunately, the maker's guarantee is inevitably invalidated and the increased power may not bring greater accuracy, while the decrease in friction can lead to spring-strain, fractured pistons or battered cylinder ends where increased velocity slams the piston continually into the back of the transfer port; the extra compression of the air may not always counteract the increased piston energy.

LEGAL RESTRICTIONS

Many owners, after lubricating and improving their guns, undoubtedly own potentially illegal items in countries where there are restricting laws. In Britain, for example, the Firearms (Dangerous Air Guns) Rules 1969, amending the Act of the previous year, quite clearly state that a gun is illegal if ANY SINGLE shot tested exceeds the limit, regardless of whether it was not representative, above the average value, or simply a result of dieselling.

Few sporting guns capable of high velocities have yet bettered 0.7 per cent VDL (Velocity Deviation Limit) on



The cocking and loading sequence of a Walther LGR. Top, left to right: Drawing back the lever (left) admits air to the reservoir; the lever is pulled back (middle) to its limit and then pushed forward (right) compressing air into the valve chamber. Bottom, left to right: the loading procedure begins with opening the breech block (left), placing the pellet in the breech (middle) and, finally, closing the breech block once more (right).

Experiments with a Sussex Armoury Jackal Hi-Power

The following summarizes experiments with a Jackal Hi-Power, lent by its manufacturer, capable of approaching the 12fp limit. Note that four out of 25 Zero pellets *exceeded* this power, though it must be stressed that these were the only illegal shots out of the several hundred fired. The chart shows what magnitude of energy variation may be expected during a 25-shot sequence from a gun capable of reasonably consistent 'ex-works' performance. (The Jackal in question recorded a best VDL of 0.80 per cent.)

1. With Eley Wasp pellets, displaying little weight variation but only moderate consistency (VDL 1.47 per cent from this string)

Actual velocity (fs)	Pellet wt (grains)	Actual energy (fp)	Energy (based on average pellet wt, 14.17 grains)
582	14.04	10.56	10.66
586	14.27	10.88	10.81
596	14.15	11.16	11.18
581	14.21	10.65	10.62
605	14.09	11.45	11.52
576	14.33	10.56	10.44
605	14.11	11.47	11.52
583	14.25	10.76	10.70
586	14.17	10.81	10.81
580	14.18	10.59	10.59
592	14.25	11.09	11.03
600	14.02	11.21	11.33
595	14.27	11.22	11.14
586	14.11	10.76	10.81
610	14.11	11.66	11.71
592	14.09	10.97	11.03
586	14.21	10.84	10.81
605	14.10	11.46	11.52
598	14.22	11.29	11.25
586	14.07	10.73	10.81
600	14.15	11.31	11.33
605	14.28	11.61	11.52
582	14.26	10.73	10.66
591	14.14	10.97	10.99
596	14.19	11.20	11.18
<i>Averages:</i>			
604	14.17	11.04	11.04

Average energy, using obtained velocities and known pellet weights, proves to be 11.04fp, which is, curiously, the same as that obtained simply by using the average pellet weight (saving some complicated calculations). Average energy obtained by multiplying the average velocity by the average pellet weight is misleading – 11.48fp. Note also that the range of energies is 10.56 – 11.61fp.

2. With Zero pellets, displaying lesser consistency of weight and velocity (VDL 2.27 per cent)

Actual velocity (fs)	Pellet wt (grains)	Actual energy (fp)	Energy (based on average pellet wt, 14.13 grains)
615	13.93	11.70	11.87
625	13.94	12.09*	12.26*
591	14.06	10.91	10.96
585	14.25	10.83	10.74
610	13.99	11.56	11.68
596	14.11	11.13	11.15
605	14.13	11.49	11.49
611	14.05	11.65	11.72

Actual velocity (fs)	Pellet wt (grains)	Actual energy (fp)	Energy (based on average pellet wt, 14.13 grains)
596	14.26	11.25	11.15
607	14.10	11.54	11.56
610	13.93	11.51	11.68
577	14.28	10.56	10.45
605	14.30	11.63	11.49
610	14.19	11.73	11.68
605	14.03	11.41	11.49
596	14.11	11.13	11.15
605	14.17	11.52	11.49
621	14.20	12.16*	12.10*
620	14.08	12.02*	12.06*
596	14.19	11.20	11.15
573	14.45	10.54	10.30
605	14.23	11.57	11.49
636	14.00	12.58*	12.69*
615	14.04	11.79	11.87
582	14.32	10.77	10.63

Averages:

592	14.13	11.45	11.45
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Average energy obtained by using observed velocities and either actual or average pellet weights: 11.45fp. Energy calculated using averages of velocity and pellet weight, 11.00fp. Energy range: 10.54 – 12.58fp.

*Outside British legal limit.

3. With H&N Match pellets, displaying appreciable weight variations but very consistent velocity (VDL 0.80 per cent)

Actual velocity (fs)	Pellet wt (grains)	Actual energy (fp)	Energy (based on average pellet wt, 14.67 grains)
582	14.59	10.98	11.03
582	14.83	11.16	11.03
586	14.17	10.81	11.19
577	14.83	10.97	10.85
583	14.66	11.07	11.07
586	14.74	11.24	11.19
582	14.75	11.10	11.03
577	14.69	10.86	10.85
573	14.81	10.80	10.70
582	14.66	11.03	11.03
591	14.43	11.19	11.38
577	14.75	10.91	10.85
582	14.42	10.85	11.03
572	14.79	10.75	10.66
582	14.69	11.05	11.03
579	14.91	11.10	10.92
588	14.58	11.20	11.27
577	14.79	10.94	10.85
582	14.63	11.01	11.03
590	14.70	11.37	11.34
577	14.88	11.00	10.85
582	14.68	11.04	11.03
577	14.83	10.97	10.85
573	14.70	10.72	10.70
577	14.27	10.55	10.85
<i>Averages:</i>			
581	14.67	10.99	10.98

Average energy from observed velocities and actual pellet weights, 10.99fp; from average pellet weight and actual velocities, 10.98fp; and from average velocity and average pellet weight, 11.00fp. Energy range: 10.55 – 11.37fp.

trial, and this rather charitable index of velocity fluctuation predicts better results than normally obtained in practice. Even if an extreme fluctuation of 0.7 per cent (± 0.35 per cent) is assumed, 11.95fp simply represents the average, remembering that energy varies with the square of velocity, of 11.87 – 12.03fp; an extreme variation of 3 per cent, in practice bettered by few guns, makes the limits 11.60 – 12.31fp, and many individual shots will lie above the limits. They may even be exceeded if the gun is tested in high ambient temperature – on a hot day, or in a centrally heated room – as the pressure of confined gas increases in direct proportion to the rise in temperature, and the muzzle velocity of some pneumatic or gas-power guns may rise for the same reason. In addition, the valves of pneumatics such as the Benjamin or Marshall-Crosman heat up rapidly. One particular pellet brand may give excessive muzzle energy, for many differing reasons, even though the legal restrictions – whatever they may be – are honoured with all others. This gun, if tested on the wrong occasion with the 'wrong' ammunition, would also prove illegal. Despite the use of highly sophisticated lubricants and many millions of man-hours of testing, no airgun yet developed gives an extreme velocity variation of much under 0.5 per cent and the vagaries of airgun construction may make perfection unattainable. Encouraging owners to tune their guns until an average of 11.99fp is reached is simply encouraging them to break the law; if nothing else, it also gives the lawmakers more grounds to implement, should they wish, a German-style power restriction of 7.5 joules. At the time of writing, however, there are no restrictions in the USA.

EXPERIMENTAL RESULTS

Several types of test equipment may be acquired quite easily, or may be built with only a minimum of scientific knowledge. Testing devices fall into two basic classes: chronographs and ballistic pendula. Most of the purely mechanical pendula incorporate severe frictional and other losses (10 per cent or more), but provide an inexpensive method of comparing results as long as velocities are recorded consistently throughout the operating range and the same apparatus is used for all the tests. However, some commercially marketed pendula have useless non-logarithmic scales, giving woefully inaccurate results. As the pendulum bob is retarded by the pull of gravity as it swings back, graduations on the scales should lie progressively closer the farther the pendulum travels. Promising ideas for piezoelectric and mechanical diaphragm 'pendulum' systems, however, have yet to be properly developed, though a market does undoubtedly exist for a cheap but accurate measuring device.

Chronographs come in greater variety than the pendula. Some measure the time a pellet takes to pass between two screens placed a known distance apart, though the pellets may lose up to 10fs in 0.22in calibre – or about 6fs for the smaller 0.177in – while penetrating the screen material. This will invalidate results in cases where the potential velocity fluctuation is very small. The more expensive screenless chronographs generally rely

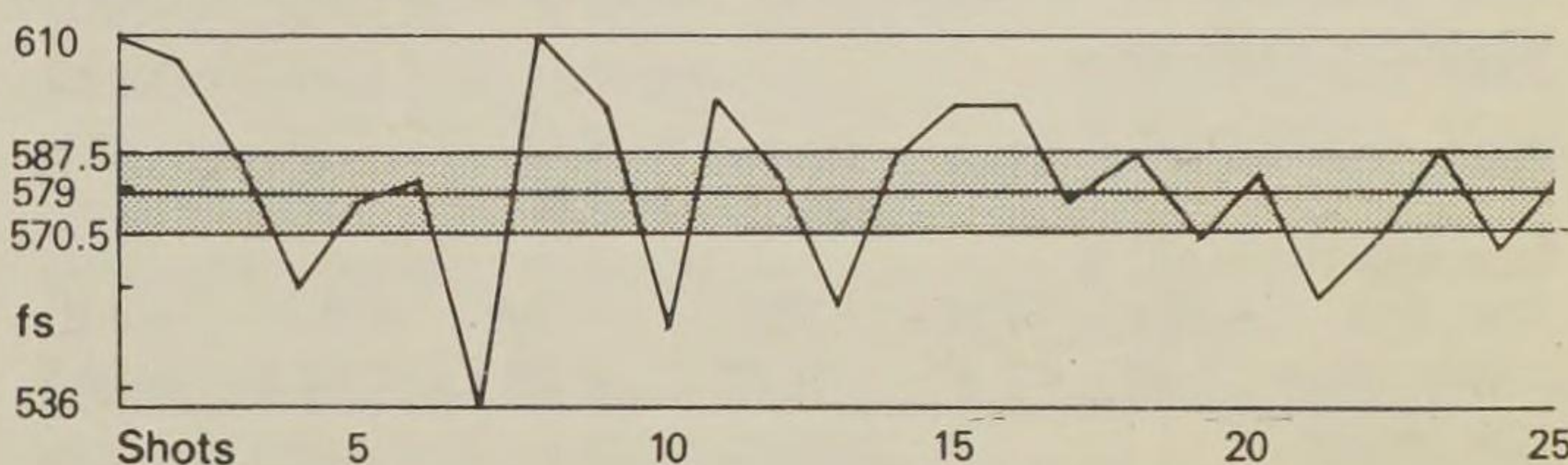
on photoelectric cells to trigger the circuitry, though sensitive microphones on an early Cardew Air Rifle Development (CARD) machine detected the shock waves accompanying the pellet. Most of the results listed in this book were obtained from a Skan Chronoscope, a portable photoelectric-cell unit with an automatic light-emitting diode (LED) display.

The interpretation of results present considerable difficulties but it is clear that the majority of facts and figures available in airgun magazines, books and similar sources are based on figures that have been wrongly interpreted. One bad shot in 10 will clearly give proportionately worse results than the same bad shot in

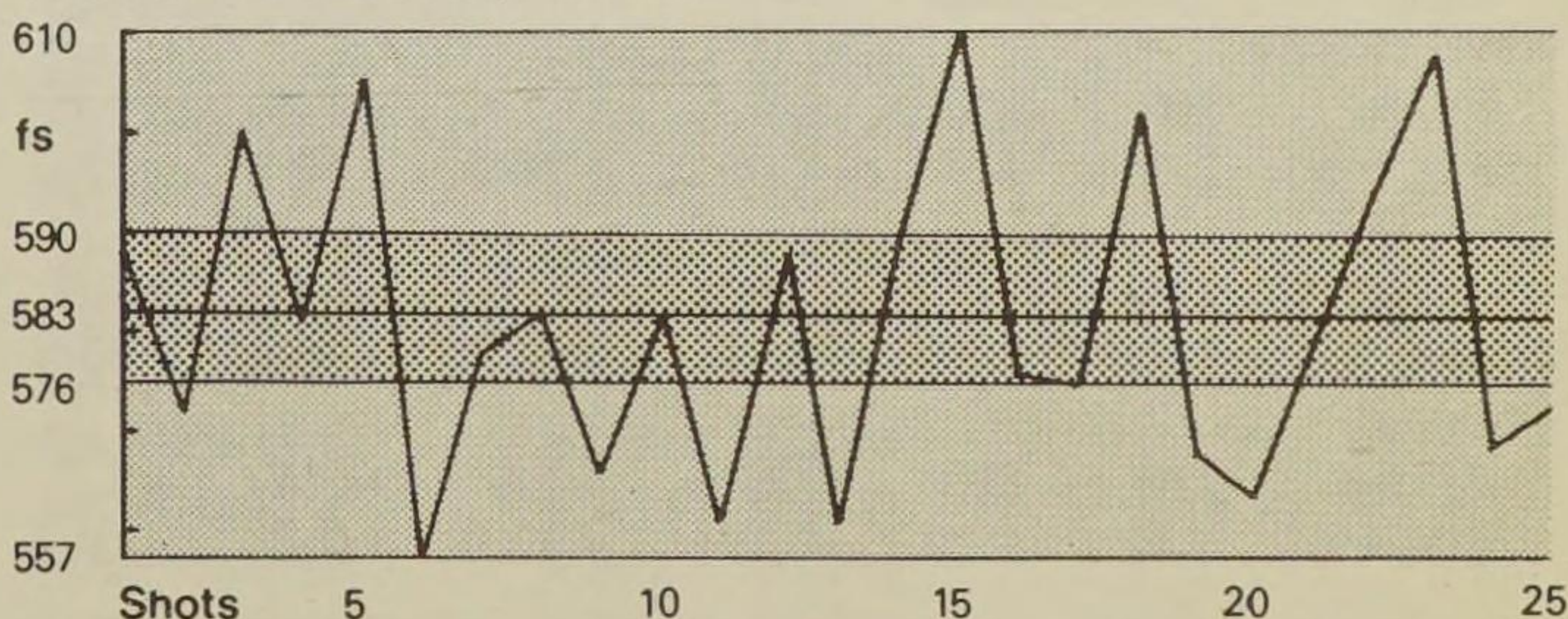
The effects of shooting-in on velocity consistency

An Arizmendi Norica Mo. 80-G (M3), loaned by Oliver J. Gower Ltd, was fired 25 times to clear the excess oil from the action. Four series of 25 shots were then fired with RWS Meisterkugeln (supplied by Leslie Hewett Ltd). The results, obtained with a Skan Chronoscope, were:

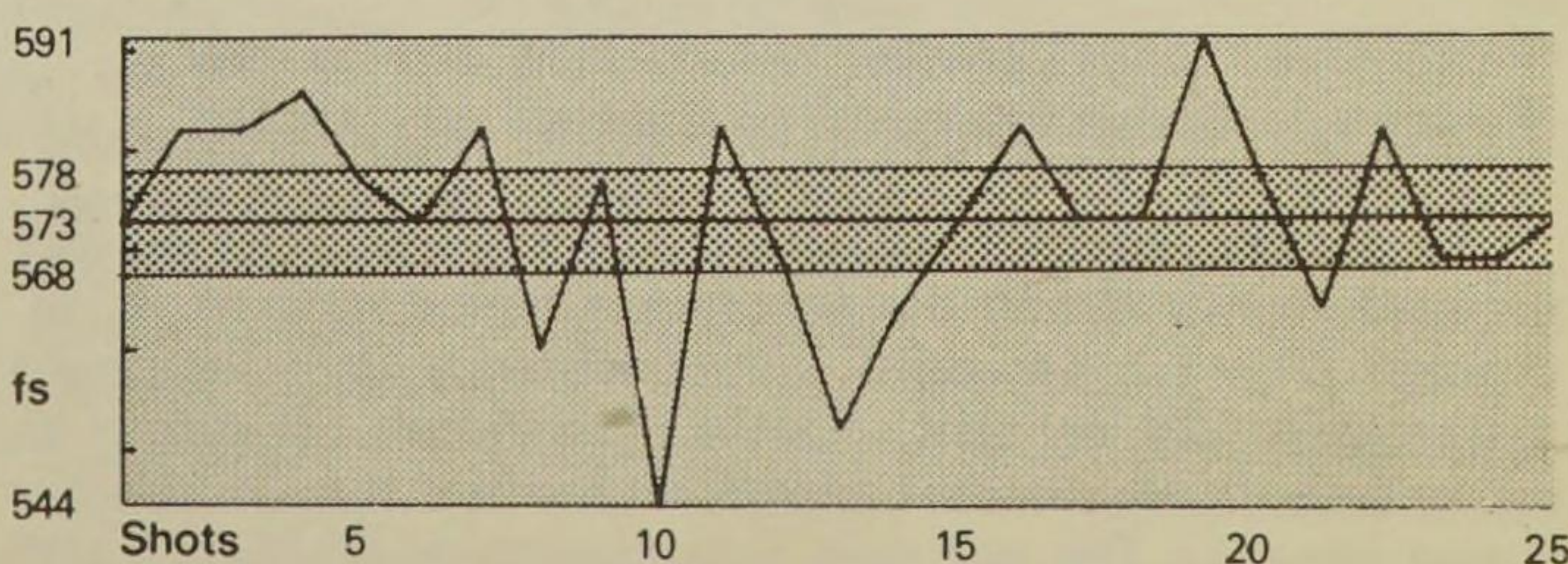
Test 1: VDL 2.94%, GD 74.



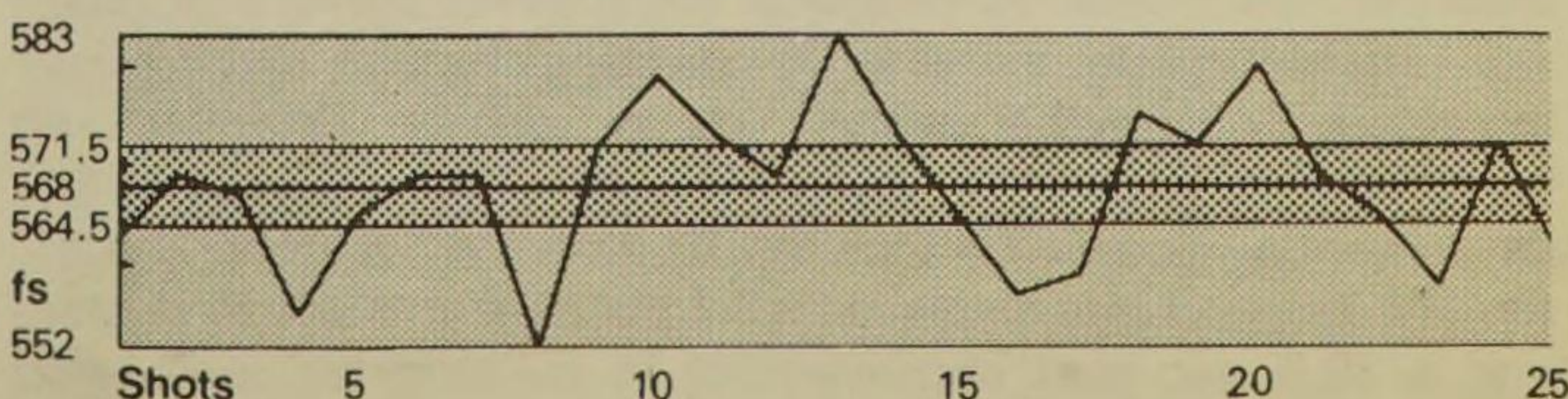
Test 2: VDL 2.41%, GD 48.



Test 3: VDL 1.69%, GD 38.



Test 4: VDL 1.31%, GD 20.



Note the consistent improvement, more evident from the fluctuations on the graph; accuracy would have improved commensurately, which indicates the problems of assessing gun quality from only a few shots.

25, if the test was continued without further mishap; similarly, a test of 100 will be a more accurate guide to performance than one of 10, 25 or even 50. None of the established statistical procedures – which have never been used during the analysis of airgun trials – will accept tests of less than 24 units as fit for further treatment, which automatically invalidates the majority of existing literature. Obtaining results with guns lent by tolerant manufacturers and distributors was understandably difficult, and trials of only 25 shots have been used throughout this book; longer tests would have been preferable, but proved impracticable.

Each gun was tested after it had been 'shot-in' to clear surplus oil from the barrel and air cylinder. Wherever possible, the tests were repeated to see if any noteworthy variation occurred, and control groups were occasionally shot to ensure that the gun's performance had not significantly deteriorated. The guns were tested direct from the warehouses, without (except in special cases) extra or specialized lubrication. Lubrication generally

improved the velocity – particularly true of guns from makers such as Mayer & Grammelspacher – though consistency occasionally suffered.

The highest velocity of the shots below is 721fs (219.5ms), and the smallest (V_{mn}) 699/213. The velocity range (VR), the difference between the two extremes, is 22fs/6.5ms; and the greatest difference between any two successive shots (GD) was 15fs/4.5ms between the thirteenth and fourteenth. The average velocity (V_x) is the total (17,792) divided by n, the total number of shots in the trial (25) – 712fs or 217ms, to the nearest whole numbers. The velocity range is about 3 per cent of the average velocity, but could have resulted from only one high and one low shot; had the remaining 23 been similar to the average velocity, a figure of 3 per cent could be a very misleading index of performance.

A system of analysis is clearly needed to minimize the effect of freak shots, which necessitates the introduction of a standard statistical term known as standard deviation (s). This is obtained by squaring the values of d, the

The effects of shooting-in and re-lubrication on a Webley Vulcan

Pellet	As new	Shot-in	Re-lub	A ¹	B ²	C ³
Eley Match						
V_x (fs)	760	734	762	-3.4	+0.2	+3.8
VDL (%)	1.22	0.87	0.70	+28.7	+42.6	+19.5
Eley Wasp						
V_x (fs)	767	746	789	-2.7	+2.9	+5.8
VDL (%)	1.52	0.93	0.73	+38.8	+52.0	+21.5
RWS Hobby						
V_x (fs)	765	765	802	0	+4.8	+4.8
VDL (%)	2.15	1.37	1.06	+36.3	+50.7	+22.6
Silver Jet						
V_x (fs)	720	731	760	-1.5	+5.6	+4.0
VDL (%)	1.79	0.85	1.11	+52.5	+38.0	-30.6
Webley						
V_x (fs)	710	699	725	-1.5	+2.1	+3.7
VDL (%)	1.42	1.08	1.29	+23.9	+9.2	-19.4

¹Percentage change (plus or minus) between 'shot-in' and 'as new'.

²Percentage change between 're-lubricated' and 'as new'.

³Percentage change between 're-lubricated' and 'shot-in'.

These figures suggest that, for this particular gun, velocity dropped slightly during the shooting-in period (column A, fs, average of -1.2 per cent) but consistency improved quite markedly (A, VDL per cent, +36%). (The Vulcan, because of its piston seal, usually shoots better 'from the box' than most other spring airguns.) The gun was subsequently re-lubricated with Sussex Armoury Nu-Flow, which was added to the mainspring chamber, the piston surface and the moving parts. The result was an immediate increase in velocity, though consistency remained much the same; some pellets exhibited an improvement while the Silver Jet, in particular, showed a deterioration. Compared (column B) with the 'as new' figures, the re-lubricated gun displayed a 3.1 per cent increase in velocity and a 38.5 per cent improvement in consistency; compared (column C) with the 'shot-in' figures, however, though velocity improved by 4.4 per cent, consistency only showed a patchy 2.7 per cent gain. Given the unscientific nature of the experiment, this is not especially significant.

A typical test using a 4.5mm BSA Mercury Mk 3

The gun was loaned by BSA and the RWS Meisterkugeln pellets were supplied by Leslie Hewett Ltd.

Shot	Actual velocity	Deviation from V_x		Deviation from previous shot
	(fs)	d	d ²	
1	715	+3	9	—
2	715	+3	9	0
3	701	-11	121	14
4	708	-4	16	7
5	721	+9	81	13 (V_{mx})
6	711	-1	1	10
7	717	+5	25	6
8	709	-3	9	8
9	720	+8	64	11
10	719	+7	49	1
11	713	+1	1	6
12	711	-1	1	2
13	718	+6	36	7
14	703	-9	81	15 (GD)
15	710	-2	4	7
16	699	-13	169	11 (V_{mn})
17	708	-4	16	9
18	720	+8	64	12
19	714	+2	4	6
20	705	-7	49	9
21	709	-3	9	4
22	718	+6	36	9
23	715	+3	9	3
24	703	-9	81	12
25	710	-2	4	7
Totals	17792	130	948	
Average	712	5.2	6.15	

difference between the velocities of any single actual shot and the average value, and totalling them up; this answer is then divided by the number of shots in the trial, n , and square-rooted to provide the standard deviation. For the Mercury with its RWS pellets, the standard deviation will be found to be 6.15fs, 0.91 per cent of the average velocity. This answer undoubtedly minimizes the effects of the freak shots, though the sample size is only just acceptable: the results would have been more accurate had the trial been extended to 100 shots, when the standard deviation could have diminished had more shots clustered around the average velocity value to counteract the occasional fluctuation due to a deformed pellet skirt or oversize head.

It is possible to obtain a prediction – albeit somewhat theoretical – of the range in which the average velocity of *all* RWS Meisterkugeln fired by this particular BSA Mercury can be expected to lie. The only acceptable way of achieving this, however, involves use of another statistical element, confidence limits (C), which are an expression of the probability of an event occurring. This book has used a value of 2.33 for C, representing a probability of 0.98. Consequently, it is 98 per cent probable that the average velocity of all shots fired by the gun/pellet combination under review will lie within the limits set by the expression:

$$V_x \pm \frac{Cs}{\sqrt{n}}$$

Or, for the test Mercury, $712 \pm \frac{2.33 \times 6.15}{5} = 712 \pm 2.87\text{fs}$

The value of 2.87 is one half of what will be known hereafter as the Velocity Deviation Limit (VDL), as one part of the limit lies above the average velocity and the other a similar distance below. These will be known as the VDL+ (higher) and VDL– (lower) respectively. The combined value of 5.74, twice 2.87, represents about 0.81 per cent of the average velocity of this particular BSA Mercury Mk 3/RWS Meisterkugeln combination, but will not apply to any other similar pairing. The final value of the VDL is influenced by the number of shots fired in the trial, owing to the inclusion of $\sqrt{n}$ in the mathematical expression quoted above. The more shots fired, the more accurate the trial will be – though airguns, with so many inherent limitations, may not always perform in full accord with statistical theory! It is suggested, however, that the test method advocated by this book does at least give airgun enthusiasts a standard system on which to compare figures.

ACCURACY

Assessing the accuracy of an airgun on an acceptable mathematical basis – quite apart from deciding how the trials should be carried out – also presents several serious problems. Many deductions of ‘accuracy’ have been attempted from as few as three small groups, which may give a totally false impression of a gun’s potential; needless to say, basing a prediction on the results of a handful of groups is also statistically indefensible. Experiments have been undertaken by clamping the gun barrel in a machine rest, often obtaining impressively

Accuracy potential

Gun	Calibre	Accuracy at 25ft ¹	Accuracy at 10m ²
Anschütz 250	4.5mm	0.07in	—
Anschütz 335S	4.5mm	—	6.3mm (RWS Meisterkgl)
BSA Mercury Mk 3	4.5mm	—	7.9mm (Eley Wasp)
BSA Mercury Mk 3	5.5mm	—	8.3mm (Eley Wasp)
BSA Scorpion	4.5mm	0.50in	—
BSF S20ME	4.5mm	0.32in	—
BSF Bavaria 55	4.5mm	0.26in	—
Feinwerkbau 65	4.5mm	0.04 – 0.09in	—
Feinwerkbau 80	4.5mm	0.04 – 0.09in	—
Feinwerkbau 124	4.5mm	0.10 – 0.18in	—
Feinwerkbau 127	5.5mm	0.14 – 0.22in	—
Feinwerkbau 300	4.5mm	0.06in	—
El Gamo 68	4.5mm	0.22in	—
El Gamo Expo 200	4.5mm	0.25in	—
El Gamo 300	4.5mm	0.22in	—
Original Diana 25D	4.5mm	—	15.3mm (RWS Diabolo)
Original Diana 27	4.5mm	0.19in	—
Original Diana 35	4.5mm	0.26in	—
Original Diana 35S	4.5mm	—	8.6mm (H&N Match)
Original Diana 35S	5.5mm	—	9.7mm (H&N Match)
Original Diana 45	4.5mm	0.18in	—
Original Diana 45	5.5mm	—	8.2mm (RWS Diabolo)
Original Diana 66	4.5mm	—	4.7mm (H&N Match)
Original Diana 75	4.5mm	0.06in	—
Original Diana 5G	4.5mm	0.33in	—
Original Diana 6G, 6M	4.5mm	0.18in	—
Original Diana 10	4.5mm	0.04 – 0.09in	—
Sheridan Model C	4.5mm	0.33in	—
Sheridan Model E	4.5mm	1.2 – 1.8in	—
Sussex Armoury Jackal HP	5.5mm	—	10.3mm (Eley Wasp)
Walther LP53	4.5mm	0.20in	—
Walther LP3	4.5mm	0.18in	—
Walther LGR	4.5mm	0.07in	—
Webley Hawk Mk 3	4.5mm	0.23in	—
Webley Hawk Mk 3	5.5mm	0.30in	—
Webley Hurricane	4.5mm	0.75 – 1.0in	—
Webley Hurricane	5.5mm	0.8 – 1.3in	—
Webley Osprey	4.5mm	0.26in	—
Webley Osprey	5.5mm	0.35in	—
Webley Osprey	4.5mm	—	6.7mm (Eley Match)
Supertarget	4.5mm	—	8.3mm (Eley Wasp)
Webley Vulcan	4.5mm	0.28in	—
Weihrauch HW30	4.5mm	0.18in	—
Weihrauch HW35	4.5mm	0.19in	—
Weihrauch HW50	4.5mm	0.18in	—
Weihrauch HW55	4.5mm	0.10in	6.2mm (RWS Meisterkgl)
Weihrauch HW70	4.5mm	0.32in	13.7mm (RWS Diabolo)

¹Figures supplied by Beeman’s Precision Airguns; from a bench rest, 3-shot groups only. ²Best groups obtained during testing; from a sandbag rest with the gun otherwise unsupported; 5-shot groups.

Note: All figures measured centre-to-centre (ctc).

small groups, but these provide little more than comparisons between the quality of rifling and the consistency of piston-action. The rigid mount usually masks the effects of poor sights and poor trigger systems, and gives the results an air of unreality.

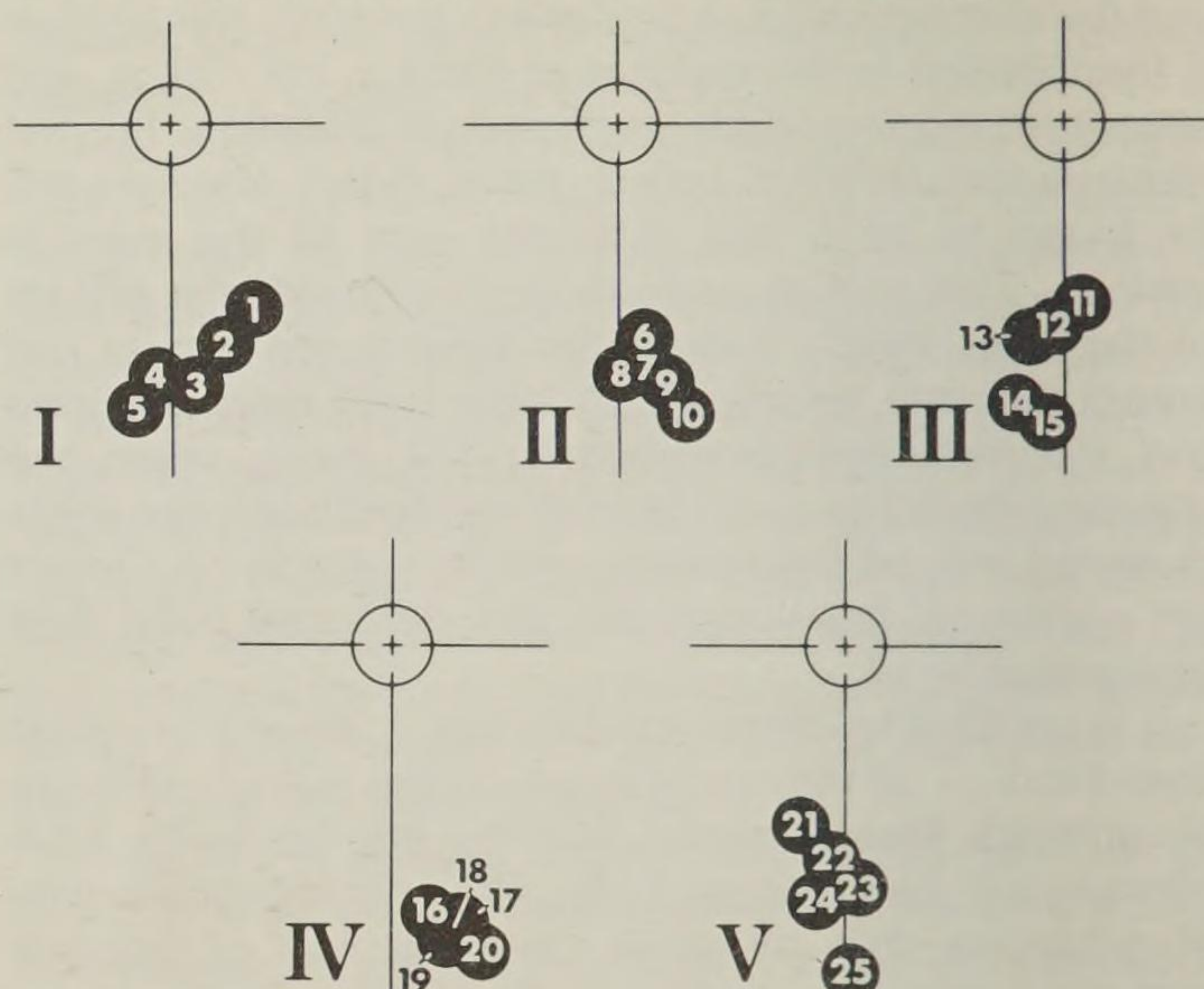
Most modern guns – even the cheap ones – are surprisingly well rifled and capable of reasonably consistent operation, but the likelihood of shooting ¼in offhand groups with, for example, the El Gamo Expo (ASI Sniper) is very small indeed, as its simple trigger has an unimpressive pull-off. In addition, no two guns of the same model will shoot identically, and may often perform markedly differently with dissimilar pellets. Shooting from a bench rest (without the barrel clamped) is a more realistic test method, as it usually enlarges groups compared with barrel-clamping systems, even though it, too, only rarely gives results that may be duplicated in the field.

A trial method was clearly needed that would not only provide the requisite 25 units for statistical analysis, but which would also include an element of reality; 25 time-consuming five-shot groups, presenting few interpretative problems, would have satisfied the first criterion, but 25 single shots were used, despite the obvious difficulties. One large 25-shot group inevitably obliterates whole sections of a target, obscuring the fall of many individual shots, and so each trial became five 5-shot groups considered as single shots. The crosshair of a telescope sight was simply held on a consistent aiming mark to ensure constant alignment while the target was changed after every five pellets had been fired.

Excellent groups were occasionally fired which, considered independently, greatly reduced the average group diameter. However, their poor location in relation to the remaining groups reduced their value to the target shooter and hunter alike. These realistic considerations greatly reduce the value of small-but-misplaced groups and expose a serious flaw in the previously accepted assessment systems. The position of groups in relation to the aim-point must not be ignored.

The shot diagrams show clearly how the shot-fall varies in relation to the aiming mark. The five groups measured 0.50in (12.7mm), 0.29in (7.4mm), 0.40in (10.2mm), 0.20in (5.0mm) and 0.48in (12.1mm) centre-to-centre (ctc) respectively, an average diameter for the first three of 0.40in (10.1mm) and 0.37in (9.5mm) for all five. As only five groups have been fired, further mathematical treatment of the groups themselves is unacceptable. All 25 shots must now be plotted in relation to the aiming mark, to locate the centre of the large 25-shot group, before analysis can begin. The table contains (i) the measurements derived from groups I-V (ii) a deduction of the position of the actual 25-shot group centre, obtained by totalling the distances to the aim-point (horizontally and vertically) and then dividing the totals by the number of shots fired, and (iii) the displacement of each shot from the true group centre, again considered horizontally and vertically. By taking the co-ordinates *iiia* and *iiib*, squaring each term (iv), and square-rooting the sum of *iva* and *ivb*, the actual radial displacement (*v*) of each individual shot from the centre of the 25-shot group may be found. The average radius may be found by totalling column (*v*) and

Assessing accuracy from 5 five-shot groups



Gun: Original Diana LG66 with 4×32 Original Diana telescope sight. Pellets: H&N Match. All supplied by Frank Dyke & Co.

Shot D_{ax} D_{gx} D_{gx}^2 D_{ay} D_{gy} D_{gy}^2 R_a

All measurements in mm

	i	iiia	iva	i	iiib	ivb	v
1	+6.8	+5.5	30.25	-15.1	+5.3	28.09	7.6
2	+4.4	+3.1	9.61	-17.9	+2.5	6.25	4.0
3	+2.0	+0.7	0.49	-21.3	-0.9	0.81	1.1
4	-1.4	-2.7	7.29	-20.5	-0.1	0.01	2.7
5	-3.1	-4.4	19.36	-23.1	-2.7	7.29	5.2
6	+2.0	+0.7	0.49	-17.2	+3.2	10.24	3.3
7	+1.5	+0.2	0.04	-19.8	+0.6	0.36	0.6
8	+0.1	-1.2	1.44	-20.3	+0.01	0.01	1.2
9	+3.8	+2.5	6.25	-21.0	-0.6	0.36	2.6
10	+5.4	+4.1	16.81	-23.8	-3.4	11.56	5.3
11	+1.4	+0.1	0.01	-14.7	+5.7	32.49	5.7
12	-1.0	-2.3	5.29	-16.6	+3.8	14.44	4.4
13	-3.3	-4.6	21.16	-17.5	+2.9	8.41	5.4
14	-4.1	-5.4	29.16	-22.8	-2.4	5.76	5.9
15	-1.7	-4.0	16.00	-24.4	-4.0	16.00	5.7
16	+3.2	+1.9	3.61	-21.6	-1.2	1.44	2.2
17	+4.1	+2.8	7.84	-22.3	-1.9	3.61	3.4
18	+4.5	+3.2	10.24	-22.8	-2.4	5.76	4.0
19	+5.5	+4.2	17.64	-23.7	-3.3	10.89	5.3
20	+7.1	+5.8	33.64	-24.8	-4.4	19.36	7.3
21	-3.5	-4.8	23.04	-14.9	+5.5	30.25	7.3
22	-2.4	-3.7	13.69	-17.2	+3.1	9.61	4.8
23	+1.2	-0.1	0.01	-19.6	+0.8	0.64	0.8
24	-1.2	-2.5	6.25	-20.7	-0.3	0.09	2.5
25	+0.4	-0.9	0.81	-26.4	-6.0	36.00	6.1
ii							
Total	+31.7			-510.1			
Mean	+1.3			-20.4			

The true, corrected group-centre, therefore, lies 1.3mm to the right and 20.4mm below the aiming point. Note. R_a is derived from $\sqrt{D_{gx}^2 + D_{gy}^2}$

Key:

D_{ax} : Deviation on the x-axis (horizontal) from the aiming mark.
 D_{ay} : Deviation on the y-axis (vertical) from aiming mark.
 D_{gx} : Deviation on the x-axis from corrected group-centre mark.
 D_{gy} : Deviation on the y-axis from corrected group-centre mark.
 R_a : Radius of actual shot fall from corrected group-centre mark.

dividing by n , the number of shots fired in the trial – in this case, 25. The average radius is 0.17in (4.2mm), or a 0.33in (8.4mm) diameter 25-shot group at a range of 33ft (10m). An actual 0.35in (9mm) group was obtained during experiments, indicating that the figure obtained from the 5-shot groups was justifiable. The results, rather surprisingly, also approximated to the 0.37in (9.5mm) average of the five groups, though it has to be admitted that none of the five had been unduly displaced in relation to the aim-mark. To check that the comparability of the alternative method, 25 5-shot groups were fired with the same combination of rifle and pellets. The results were:

group diameter										
in	0.20	0.24	0.28	0.31	0.35	0.39	0.43	0.47	0.51	
mm	5	6	7	8	9	10	11	12	13	
frequency	2	1	4	4	5	4	3	1	1	

The average value of these is 0.35in (8.8mm), quite close to the value of 0.33in (8.4mm) obtained by the 'average radius' system.

Use of the figure for the standard deviation, which will be found to be 2.03mm or 0.08in by the method discussed previously, and the confidence limit value of 2.33 gives a final value for the Accuracy Deviation Limit (ADL) of 0.07 (1.90mm), 22.5 per cent of the average diameter. This is derived by doubling the product of the standard deviation and the confidence limit (2Cs), and then dividing the answer by $\sqrt{n}$, the number of shots fired. The inference from these figures is that there is 98 per cent probability that the average group diameter of all pellets fired by this Original Diana 66 will lie between 0.26in (6.5mm) and 0.41in (10.3mm), or 0.33 ± 0.07 in (8.4 ± 1.9 mm). Interestingly, over 90 per cent of the individual 25×5 groups lie within or very close to this range.

Another trial, fired from a 5.5mm Original Diana 45 at 66ft (20m), may also be highlighted: the two best groups were IV and V, and any attempt to assess accuracy on a basis of three five-shot groups would have been totally misleading. The average diameter of the three groups is 0.89in (22.5mm), while all five average 0.75in (19.1mm); but the average radius will be found to be 0.28in (7.2mm) (diameter 0.57in/14.4mm), allowing for the location of the group centres and the relatively few 'flyers'.

DISMANTLING, MAINTENANCE AND REPAIR

This short section relies heavily on articles written by Dennis Commins in *Guns Review* (1975) and the NARPA (National Air Rifle & Pistol Association) Bulletin, neither of which are still available. Mention must also be made of Eddie Barber's 'Gunshop' articles in *Airgun World* and chapter nineteen in Wesley's book *Air-guns & Air-pistols*.

Perhaps the single most important tool is a beam clamp, which, in its sophisticated form, is an angle-iron base with two clamping blocks, one of which carries a screw-thread enabling fine adjustments of length. The clamp copes with the considerable compression of many mainsprings (about 37lb in the uncocked Webley Vulcan) and facilitates removal of the end cap or mainspring bearing block. Proper precautions are essential;

otherwise, an eye can easily be lost. Most of the remaining tools are readily available in any workshop: a light tack or rubber-faced hammer; spanners; various screwdrivers, their ends parallel-ground to prevent unnecessary burring of screws; a suitable vice with jaw protectors; punches, which may be simply adapted from large nails; a small pair of needle-nosed pliers, and many others. A rifle rest can be made from spare pieces of wood, with a padded 'V', and cylinder buffing tools – useful for polishing the internal surface – can be made from dowelling and layers of foam rubber.

Abbey Supply Co. makes or imports many lubricants and other maintenance aids which are widely distributed in Britain. Alternatives are available in the USA – from agencies such as Beeman's Precision Airguns – while a relative newcomer, Sussex Armoury's Nu-Flow multi-purpose lubricant, possesses outstanding rust resistance.

A study of exploded-view drawings, many of which will be found in the following pages, often gives sufficient clues to allow dismantling to begin. Most rifle stocks are retained by one screw or bolt upward through the fore-end and another through the front of the trigger guard; alternatively, there may be two lateral fore-end screws or two diagonally, those of the Webley Vulcan and the Milbro Dianas being good examples. The Original Diana 50 (one exception to the rule) has an additional securing stud in the fore-end, visible when the cocking lever is displaced and necessitating a special tool to remove it. Most Weihrauch's require removal of both trigger-guard screw, and the Original Diana 45 has a transverse 'recoil bolt' above the trigger to be driven out first. Pistol designs generally parallel rifles, though many modern handguns display one- or two-piece injection-moulded grips or grip/frame units retained by four short screws two-a-side. Loose crosspins may be encountered in the trigger sub-assembly once the grips have been removed, and adhesive tape is advisable to prevent losing the pins.

Most barrel-cocking rifles may be divided into groups depending on how the cylinder end cap and/or mainspring block are retained, and the design of the trigger system. Most end caps are held in the air cylinder by transverse pins or bolts, or – like the Weihrauch's and the BSA Mercuries and Airsporters – by screwing them into the cylinder-end. However, there are exceptions to the rule: guns where the end cap hides a secondary mainspring bearing or where there is no bearing at all. The latter is true of the Original Dianas, featuring the Giss Contra Piston system, which need a special tool to remove the double piston and spring assembly. It is advisable to assume that the end cap is under spring pressure and potentially dangerous; otherwise, driving out the crosspins may simply allow the cap to fly off. The trigger or trigger sub-assembly must be detached before the mainspring and piston, as the nose of the trigger or sear inevitably projects into the air cylinder behind the tail of the piston rod and the piston invariably fouls the trigger nose as it is being removed. Trigger systems divide into four classes: simple levers pivoted on a lateral pin through the air cylinder; in housings welded or screwed to the underside of the cylinder; pivoted in a monoblock screwed into the cylinder-end or contained in a monoblock or sub-assembly slotted into the receiver.

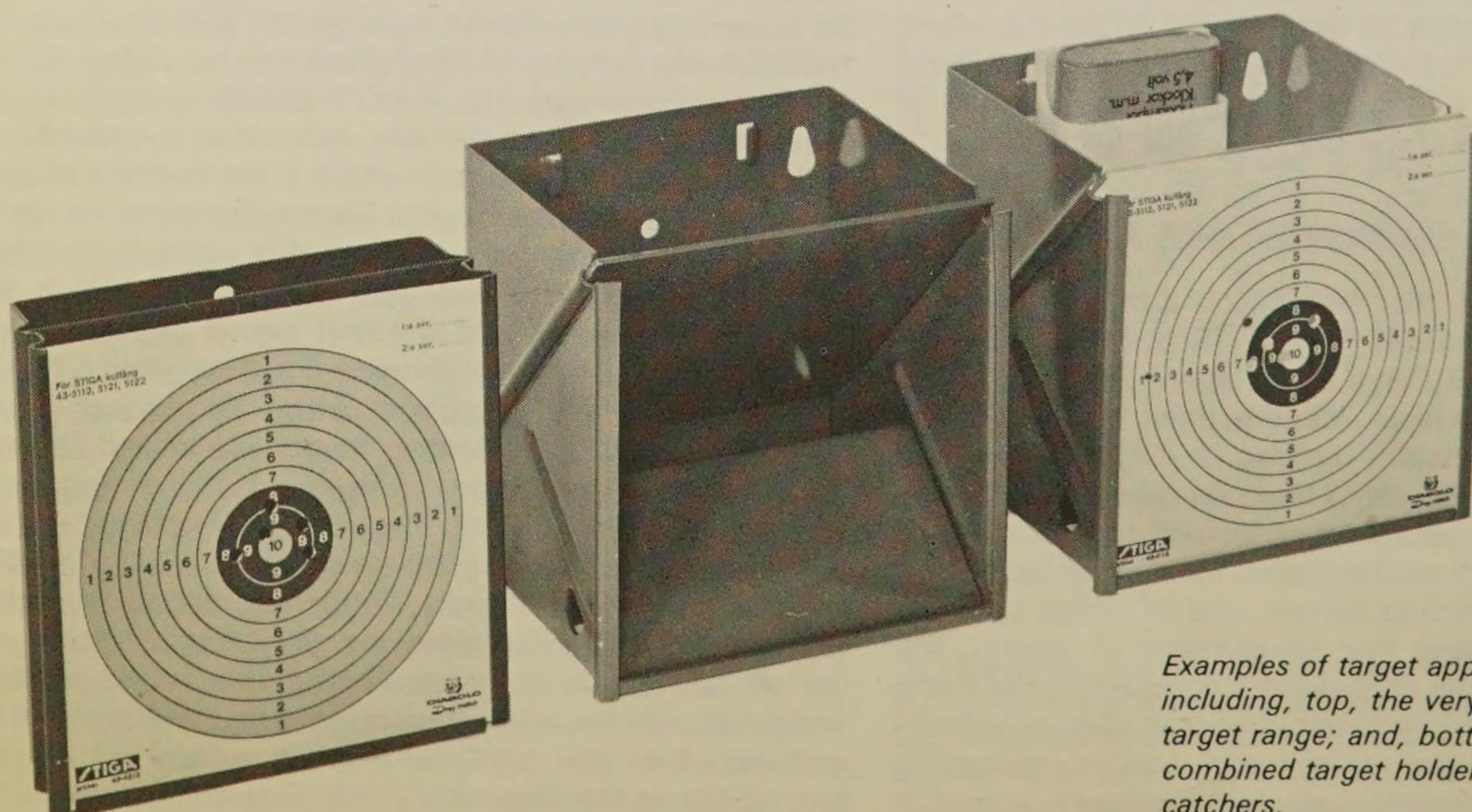
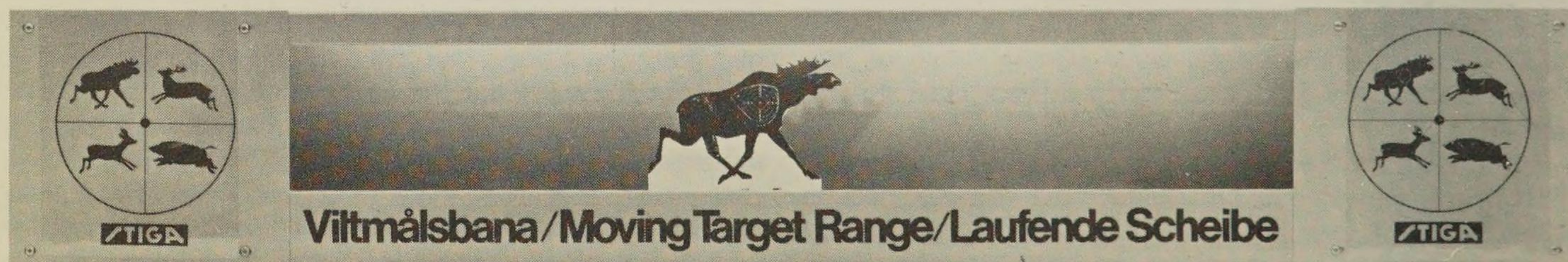
Guns should be examined visually before dismantling is attempted. The presence of crosspins through the rear of the air cylinder may indicate that they retain the end cap and act as a spring bearing, and should not be driven out until suitable precautions have been taken; a screw-on end cap may also act as the mainspring bearing, and requisite care should be taken during removal. There are several guns whose construction appears misleading: the Slavia 620 appears to have a screwed-in rear block, with a pin through the cylinder acting as the trigger pivot, but the rear block is actually a loose fit (retained by a small screw through the cylinder wall) and the lateral trigger pivot pin also retains the mainspring bearing block.

Some guns have separate screw-in end caps or trigger blocks retaining the spring. After the parts that prevent unscrewing (generally the trigger unit) have been removed, the gun should be held downwards with its muzzle – or the tip of the receiver if the barrel has been removed – placed in a bored-out wooden block. As pressure is applied to the end cap, the receiver should be rotated slowly until the cap comes away, whereafter the cap can be carefully removed and the spring/piston unit withdrawn. If the end cap is retained by pins or bolts, the beam clamp becomes obligatory. The receiver or receiver/barrel assembly should be placed in the clamp, and a short length of stout dowel used to transfer pressure from the clamp-block if the mainspring bearing is set into receiver. The dowel takes the pressure while the lateral pins are driven out, after which the clamp can be released to allow the cap or bearing-block to come away. Some guns have a second crosspin as a safety

factor, often loosely fitted and requiring a piece of adhesive tape to prevent its loss.

The piston can usually be withdrawn after the spring has been removed, though the cocking-lever assembly has often to be disconnected first. The inside surface of the cylinder can be polished with Autosolv and flaws in the piston surface suitably repaired. Leather piston washers may be soaked in a mixture of silicon wax and Properts' Saddle Soap to improve their pliability, while synthetic piston or breech-sealing washers can easily be replaced; leather breech seals, now rarely seen, should be discarded wherever possible. Care should be taken to avoid damaging either the new washer on the threaded rear portion or any internal burring in the air cylinder.

There are several famous exceptions to the dismantling guidelines, including guns with safety catches in the end-blocks – such as the Haenel 303 and the Feinwerkbau Sport – and bolt-action designs such as the Haenel LG311. Many Original Dianas exhibit an undeniably efficient but complicated ball-sear system, extremely troublesome to dismantle and offering few clues to a cursory external examination. However, most airguns are straightforward to dismantle, particularly in the lower price ranges where sophistication is uncommon. A few require specialized knowledge or equipment, such as the Feinwerkbau, Original Diana and (to a lesser extent) the Anschütz recoilless designs, sporting rifles such as the Original Diana 45, and many of the pneumatic or gas-powered types. Moreover, tinkering with some guns invalidates the makers' guarantees, and this should be checked before commencing.



Examples of target apparatus from Stiga, including, top, the very entertaining moving target range; and, bottom, typical combined target holders and pellet catchers.

Manufacturers and Distributors

The following companies, or their agents, supplied information during the period in which this book was compiled; additional entries will be considered for subsequent editions, though only bona fide manufacturers, their agents, or wholesale distributors will be included. The addresses of the principal manufacturers of airguns and pellets will be found on page 119 and in the main directory.

Abbey Supply Co., 6 Mill Lane, Wallingford, Oxfordshire OX10 0DH, England. Lubricants and Chinese airguns.

Accuracy International (Shooting Sports) Ltd., 43 Gladys Avenue, North End, Portsmouth, Hampshire PO2 9AZ, England. Walthers, 'Al' sight inserts, target shooting accessories.

Aircraft Equipment International, King's Ride, Ascot, Berkshire SL5 8AR, England. Singlepoint sights.

Air Rifle Headquarters, 247 Court Street, Grantsville, West Virginia 26147, USA. Weihrauch, Feinwerkbau, BSFs (Wischo) and accessories.

ASI, Alliance House, Snape, Saxmundham, Suffolk IP17 1SW, England. El Gamo, Feinwerkbau guns, accessories.

Beeman's Precision Airguns Inc., 47 Paul Drive, San Rafael, California 94903, USA. A variety of guns, including Feinwerkbau, Weihrauch, Webley, BSF, Original Diana and Walther; H&N and Hasuike Seisakusho pellets and accessories.

Bushnell Optical Co., 2828 East Foothill Boulevard, Pasadena, California 91107, USA. Bushnell and Bausch & Lomb telescope sights.

Cardew Air Rifle Developments (CARD), 12 Victoria Road, Acocks Green, Birmingham B27 7YA, England. Ballistic pendula, chronographs and associated equipment.

Frank Dyke & Co. Ltd., 1-7 Ernest Avenue, West Norwood, London SE27 0DG, England. Original Diana and some Anschütz rifles; H&N pellets.

Edgar Brothers, Catherine Street, Macclesfield, Cheshire SK11 6SG, England. Czech airguns, including the Tex pistol.

Walter Gehmann, D-7500 Karlsruhe/Baden, Karlstrasse 40, West Germany. Target shooting equipment, sights, etc; distributed in Britain by Surrey Guns Ltd (see below).

Oliver J. Gower Ltd., Unit K1, Cherrycourt Way, Stanbridge Road, Leighton Buzzard, Bedfordshire, England. Arizmendi guns, Hasuike Seisakusho pellets, Kassnar telescope sights.

Gunmark Ltd., The Armoury, Fort Wallington, Fareham, Hampshire PO16 8TT, England. Anschütz barrel-cocking rifles.

Leslie Hewett Ltd., Upton Cross, Liskeard, Cornwall, England. RWS pellets, Tasco telescope sights.

Hull Cartridge Co. Ltd., Bontoft House, National Avenue, Hull, Humberside HU5 4HZ, England. Weihrauch and Sharp guns.

Hy-Score Arms Co., 200 Tillary Street, Brooklyn, New York 11201, USA. Original Diana, Hämmerli and other guns, and H&N pellets.

Interarms, 10 Prince Street, Alexandria, Virginia 22313, USA. Walther guns and many other cartridge weapons.

Kassnar Imports, POB 6097, Harrisburg, Pennsylvania 17112, USA. Japanese-made telescopes, etc (see Gower).

Albrecht Kind GmbH & Co., D-5270 Gummersbach 31 Hunstig, Postfach 31 01 45, West Germany. Original Dianas, Daisies, Weihrauchs and other guns, accessories, etc.

Leupold & Stevens Inc., POB 688, Beaverton, Oregon 97005, USA. Telescope sights.

Lyman Products Corp., Route 147, Middlefield, Connecticut 06455, USA. Telescope and open sights, etc.

Norman May & Co., Union House, 2 Princess Terrace, Bridlington, Humberside YP15 2RD, England. Weihrauch, BSF and Hämmerli guns, Bimoco pellets.

Millard Bros Ltd., POB 24, Motherwell, Lanarkshire ML1 4UP, Scotland. Daisy, Baikal, Marksman guns; Prometheus pellets, etc.

David Nickerson (Tathwell) Ltd., The Old Vicarage, Louth, Lincolnshire LN11 9ST, England. Stiga target equipment and pellets; Phillips gun-care products, etc.

Optima Leisure Products, 75 Foxley Lane, Purley, Surrey CR2 3HP, England. Telescope sights, Weihrauch guns, etc.

Parker-Hale Ltd., Golden Hillock Road, Birmingham B11 2PZ, England. Sizerpac, Hoppes gun-care products, cleaning equipment; Nikko, Pecar and Redfield telescope sights, etc.

Pecar AG, D-1000 Berlin, West Germany. Telescope sights.

Precise Sports Corp. (formerly Precise Imports), 3 Chestnut Street, Suffern, New York 10901. BSA guns, Czech guns, etc.

Redfield Co., 5800 East Jewell Avenue, Denver, Colorado 80224, USA. Telescope sights (see Parker-Hale).

Relum Ltd., Carlton Park Industrial Estate, Kelsale, Saxmundham, Suffolk, England. Telly airguns.

Salter & Varge Ltd., Publicity House, 10A West Street, Southend-on-Sea, Essex SS2 6HJ, England. Birchwood-Casey gun-care products.

Skan Electronics, 7 St John's Avenue, Brentwood, Essex CM14 5DF, England. Chronographs, target-games, etc.

Stoeger Industries, 55, Ruta Port, South Hackensack, New Jersey 07606, USA. El Gamo airguns, and many other non-airgun lines.

Surrey Guns Ltd., 9 Manor Road, Wallington, Surrey SM6 0BZ, England. Rhino telescope sights, Gehmann accessories.

Sussex Armoury, Sturton Place, Station Road, Hailsham, East Sussex BN27 2AU, England. Benjamin, Crosman, IGI, Sheridan and other guns; Nu-Flow lubricant, Ballistic Bolts, accessories, etc.

Stiga AB, Sporting Goods Division, Box 6, S-573 01 Tranås, Sweden. BSF and El Gamo guns; makers of Stiga pellets and accessories, notably targets.

W. R. Weaver Co., 7125 Industrial Avenue, El Paso, Texas 79915, USA. Telescope sights.

Viking Arms Ltd., Beverley, Harrogate, North Yorkshire HG3 5JA, England. Haenel and Predom Łucznik guns.

KEY TO SYMBOLS

ASSESSMENT SYMBOLS

An attempt has been made to grade each gun according to a number of important criteria. This is a somewhat subjective topic which is bound to be a little controversial, but without it this book would be appreciably less useful. The opinions reflected here, therefore, should be taken as a rough guide. Each gun was assessed on up to 50 different points, divided among the five main groups, before decisions were reached; guns that could not be obtained for trial, or at least a cursory examination, have been assessed from a combination of illustrations, parts-lists, exploded diagrams, data and opinions reflected in the columns of the airgun magazines. The symbols run from 1 (poor) through 2 (below average) and 3 (average) to 4 (good) and 5 (very good). An effort has been made to consider the guns within their classes rather than on any absolute scale, particularly where value for money, design/construction, and ease of maintenance are concerned, and this should be borne in mind when using the Comparachart (page 137); for example, it is impossible to draw direct comparisons between the Feinwerkbau 300 and the Crosman 788 BB Scout.

- Value for money.
- ⊙ Design, construction, finish, workmanship.
- ⊗ Relative simplicity, ease of maintenance and dismantling/reassembly.
- ⊖ Suitability for target shooting.
- ⊕ Suitability for sporting use.
- ⊠ Suitability for 'plinking' (non-serious target or field shooting); otherwise, these guns would receive only one symbol on the other scales — a misleading guide to their intent and usefulness.

OTHER SYMBOLS

An asterisk by 'Standard Warranty' indicates that the warranty terms may not apply in certain US states, where local laws prevail.

- Ⓢ Indicates a gun whose power exceeds the British 12fp limit, or a gas-powered design requiring firearms certification.
- Ⓢ Indicates a gun-type that may exceed the British 12fp limit, though some examples (such as the Crosmans and Sheridans) have been modified to conform.
- Ⓢ Indicates a gun whose power exceeds the German 7.5J limit.
- Ⓢ Indicates a gun whose power lies on or very near to the German 7.5J limit.

Note. For explanation of abbreviations used, please see page 8.

Airgun Directory

AIRGUNAID

Airgunaid, 131 Springfield Road, Chelmsford, Essex, England. US distributor: none; Standard warranty: 24 months.

This airgun retailing business and gunsmithing agency markets its 'own' rifles. They are built largely on Milbro Diana components though the stocks, for example, are made locally.

Airgunaid SP5

This is a modified Milbro Diana G80 (see page 92), chambering 5mm/0.20in pellets. It has a very distinctive rounded fore-end. *Type*: break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 5.0/0.20; *loa*, 1,080/42.5; *bl*, 440/17.6; *wt*, 2.88/6.35; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

Airgunaid TR2

This cheap, low-grade target rifle, offering quite good value, is also built on Milbro Diana G80 lines. Its new stock is better proportioned than the original but, regrettably, lacks a cheekpiece and a butt-plate, though the slight Monte Carlo comb suits it equally to right- or left-handed users. There is a small auxiliary barrel weight and a Milbro aperture sight. *Type*: break-barrel spring-air rifle, detent-locked (bolt); *cl*, M3; *cal*, 4.5/0.177; *loa*, 1,068/42.0; *bl*, 440/17.6; *wt*, 3.30/7.28; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

ANSCHÜTZ

J. G. Anschütz GmbH, Jagd-und Sportwaffenfabrik, D-7900 Ulm/Donau, Daimlerstrasse 12, West Germany. British distributors: Gunmark Ltd (LG330, 333 and 335), Frank Dyke & Co. Ltd (LG250, 275); US distributor: formerly Savage Arms Co.; Standard warranty: 12 months.

Founded by Julius Gottfried Anschütz in 1856, Anschütz has become one of the world's premier manufacturers of target guns since recommencing operations in Ulm in 1949. The first sporting rifles were made in 1950 and the first Schmeisser-system bolt-action LG275 air rifles soon followed. The sidelever-cocking semi-recoilless LG220 appeared in 1959 and about 5,000 bolt-action training rifles were

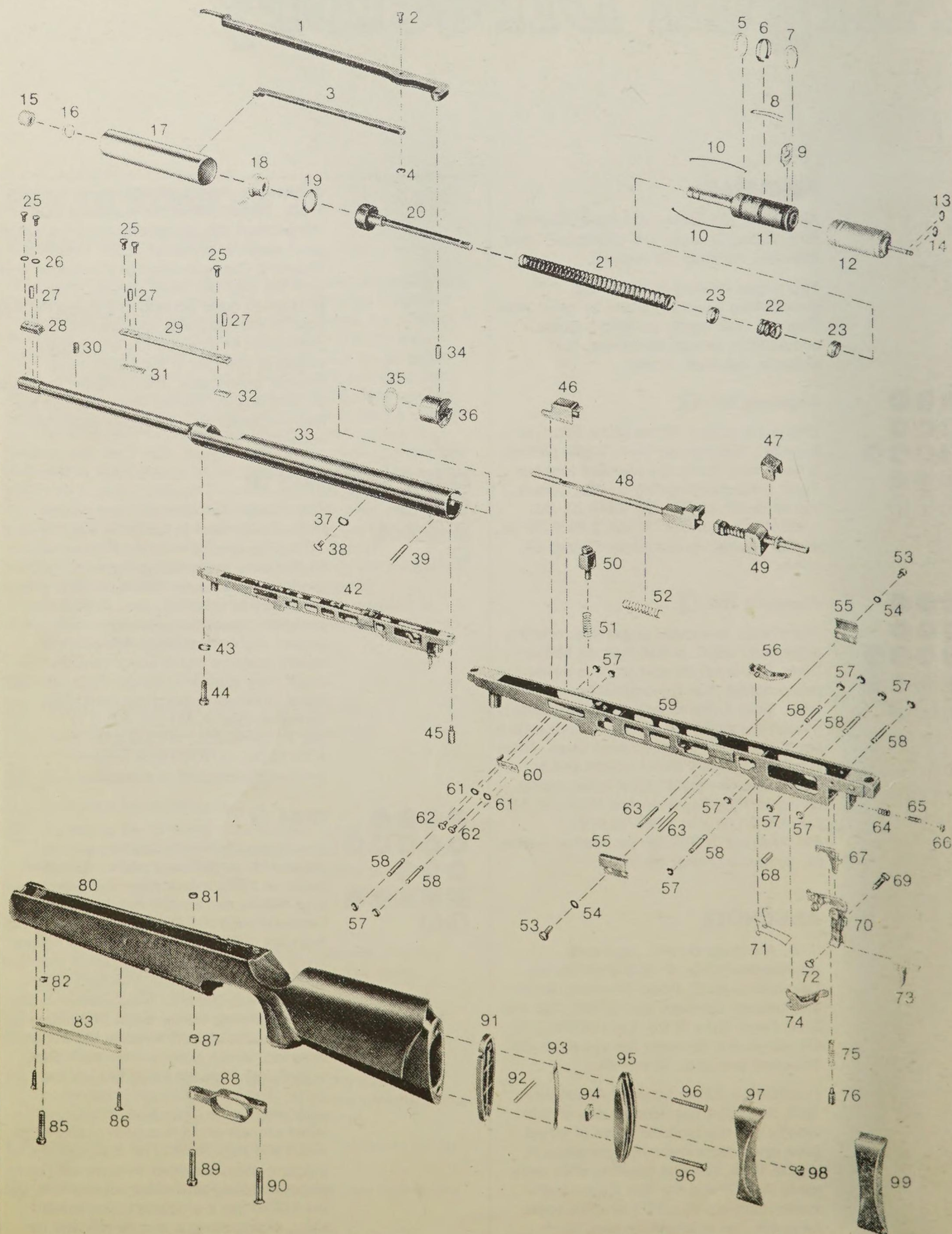
delivered to the Egyptian Army in the early 1960s. Prototypes of the perfected LG250 competition rifle, developed from the 220 in great secrecy, appeared at the 1966 World Shooting Championships in Wiesbaden and took the gold and silver medals. Volume production commenced in 1968 and the first guns in the 330-series appeared in 1970; production of these continues, though extensive changes in the LG335 have recently been made. The company's airguns all have slightly choked barrels, which are responsible for their reputedly outstanding accuracy.

LG220

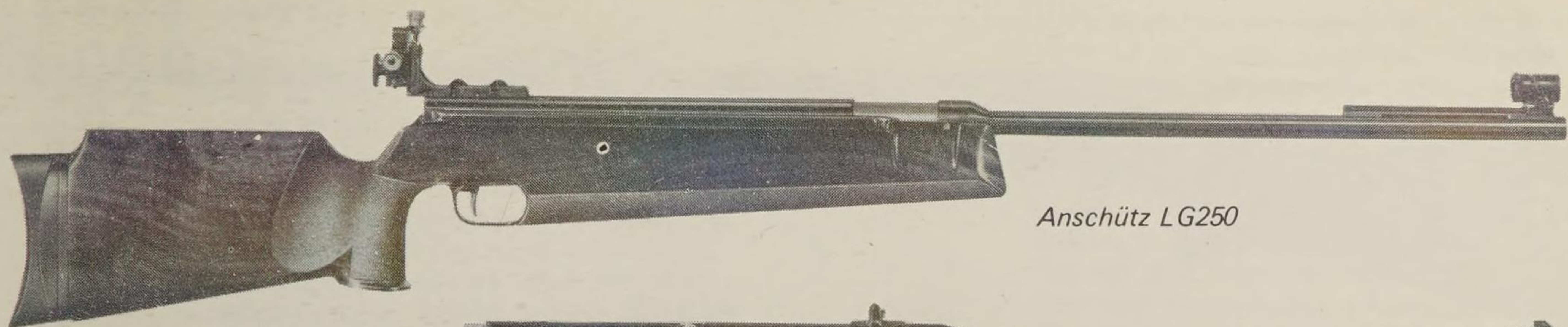
This competition rifle was designed by Helmut Liebmann in 1957–58 (DE PS 1,111,064, sought in April 1958); about 11,000 were made during the eight years of production, between 1959 and 1967. Rarely seen outside Germany, the LG220 had a pneumatic recoil-suppressing system which caused slight vibration on firing. Match-quality aperture sights and a competition stock were standard fittings. *Type*, fixed-barrel sidelever-cocking semi-recoilless spring-air rifle; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,125/44.3; *bl*, 470/18.5; *rf*, 12R; *wt*, 4.70/10.36; *ps*, two metal rings; *bs*, synthetic O-ring; *sft*, automatic.

LG250

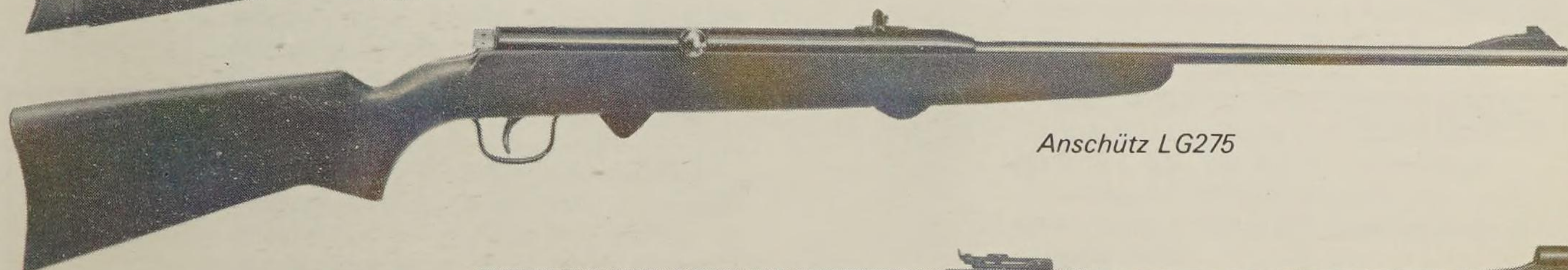
Prototypes of this rifle appeared at Wiesbaden in 1966 and series production began in 1968. It features a hydraulic recoil-suppressing mechanism developed by Hermann Wild (DE PS 1,287,479, sought in February 1966), which comprises a hollow rearward-moving secondary piston chamber containing viscous fluid. The fluid seeps around a sub-diameter fixed washer as the piston chamber travels back. The action is quite smooth and the virtually imperceptible vibration, which accompanies each shot, occurs well after the pellet has left the barrel. The LG250 has not achieved particularly wide dispersion, despite its initial success and the superb quality of its wood and metalwork. The design of the trigger system is neither as compact nor as elegant as the Feinwerkbau or Walther, but the LG250 has a unique adjustable front sight, sliding along a muzzle-rail, and its long action makes fitting a large telescope sight rather easier. *Type*, fixed-barrel



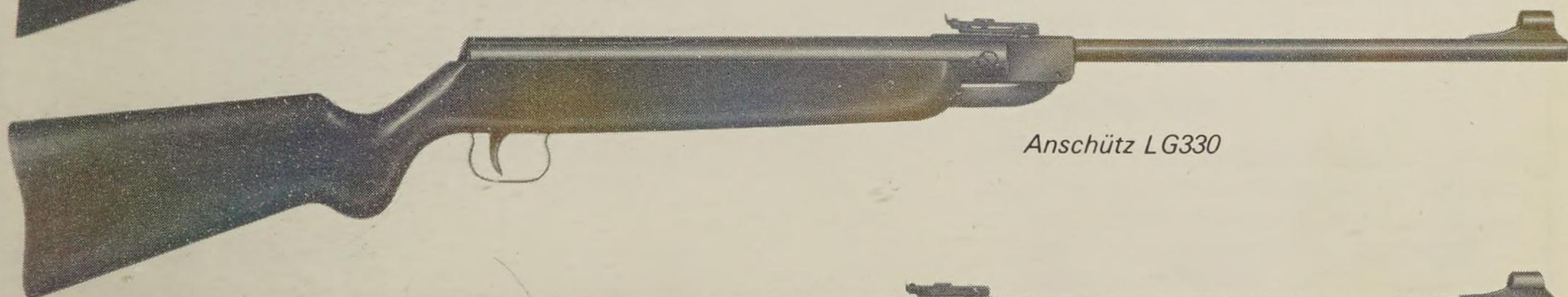
For key to parts illustrated, see manufacturer's literature



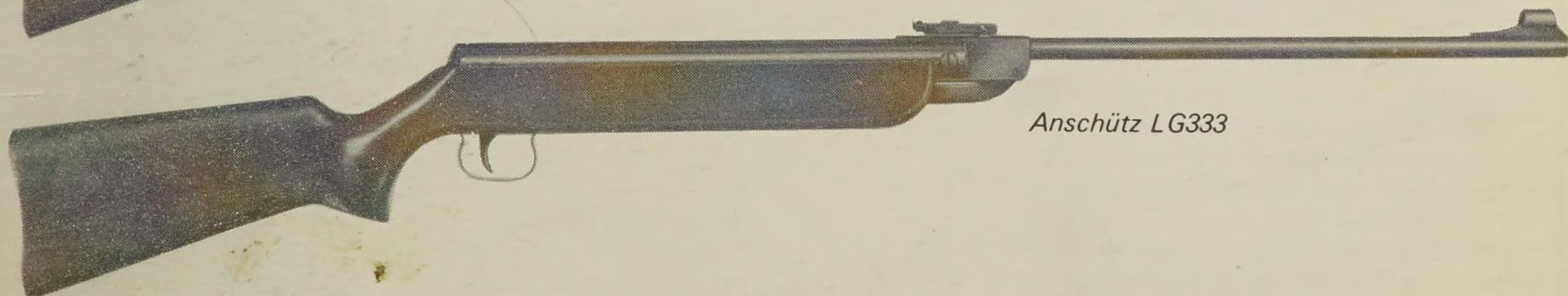
Anschütz LG250



Anschütz LG275



Anschütz LG330



Anschütz LG333

sidelever-cocking recoilless spring-air rifle; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,135/44.7; *bl*, 470/18.5; *rf*, 12R; *wt*, 4.95/10.91; *ps*, two metal rings; *bs*, synthetic O-ring; *sft*, automatic.

LG275

Introduced in the 1950s, this descendant of the prewar Haenel Sportmodell displays outstanding safety features in the guise of an automatic trigger-blocking system preventing premature piston release and a manual Mauser-pattern 'wing' on the back of the receiver. The inherently low-powered cocking system is rather stiff to operate, but the autoloading single-stroke is advantageous. Rarely seen outside Germany, the 275 is a very interesting 'fun gun' but appreciably more expensive than similar Crosman and Daisy designs. *Type*, fixed-barrel bolt action spring-air rifle; *cl*, R5; *cal*, 4.40/0.173 (ball); *loa*, 1,160/41.7; *bl*, 440/17.3; *rf*, 12R; *ps*, leather washer; *sft*, manual and automatic; *mag*, 6- or 12-shot detachable box.

LG330

The LG330 is the simplest of the Anschütz barrel-cocking designs, making its first appearance in 1970. Its outstanding feature is the quality of finish and construction compared with that of its cheaper rivals,

but other good points include the trigger, which gives a crisp, though non-adjustable, pull weight of about 2.5lb (1.1kg), the telescope sight mounts on the receiver and an automatic trigger-blocking safety system. Guns made prior to about 1978 had simple back sights adjustable for elevation only, but newer examples have the sturdier and more sophisticated LG333 sight. The short butt is intended for junior marksmen, though the 330 is not particularly light. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177; *loa*, 1,030/40.6; *bl*, 420/16.5; *rf*, 12R; *wt*, 2.85/6.28; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.

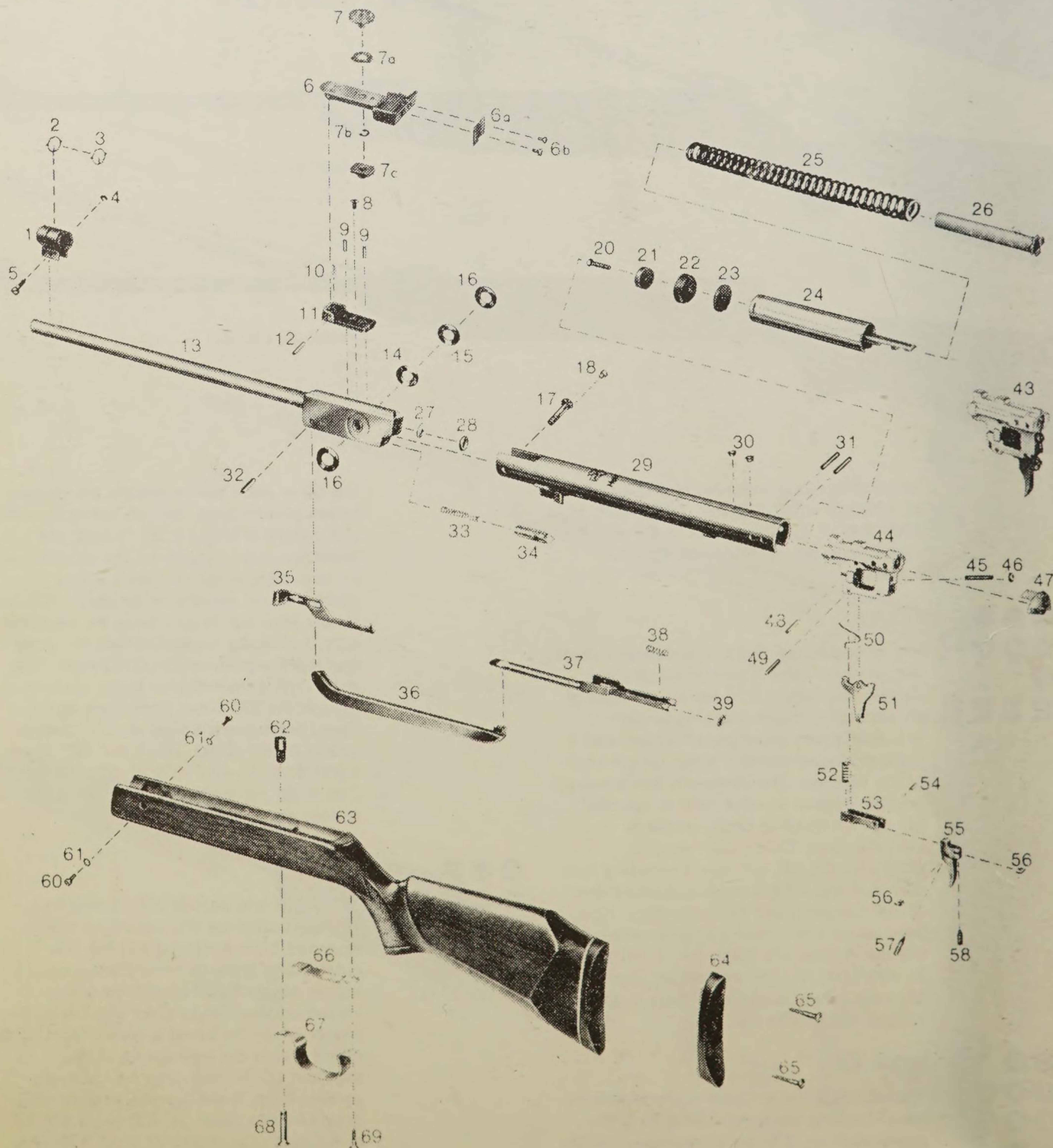
LG333

This larger and heavier 330, dating from 1970–71, displays the usual high quality expected from Anschütz but has few outstanding features other than good trigger design and the efficient spring-loaded under-receiver slider that blocks the trigger when the barrel is open. The LG333, which shares the mainspring of the standard LG335, develops considerable power. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,090/42.9; *bl*, 470/18.5; *rf*, 12R; *wt*, 3.12/6.88; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.

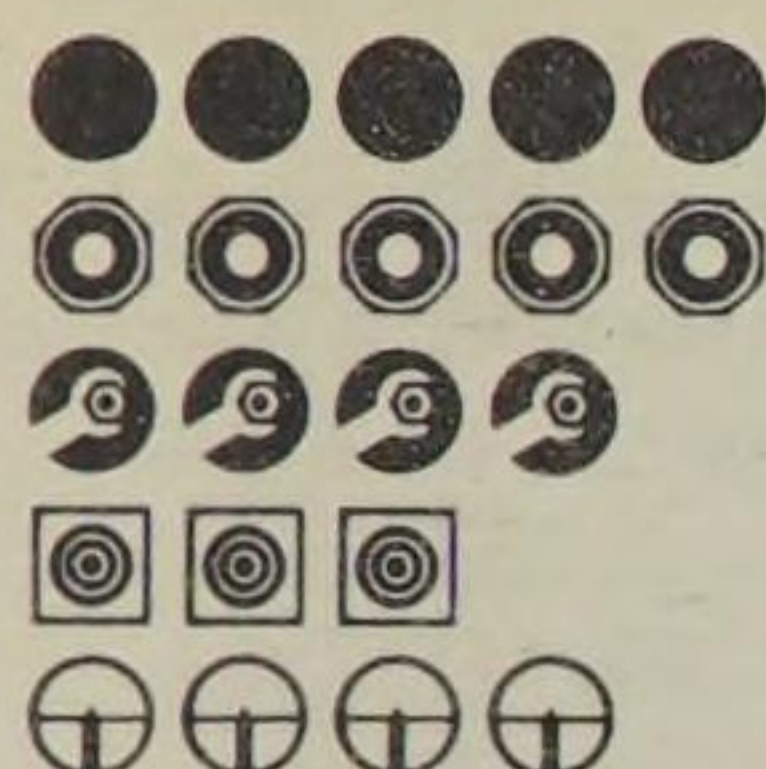


Anschütz LG335

Anschütz LG335

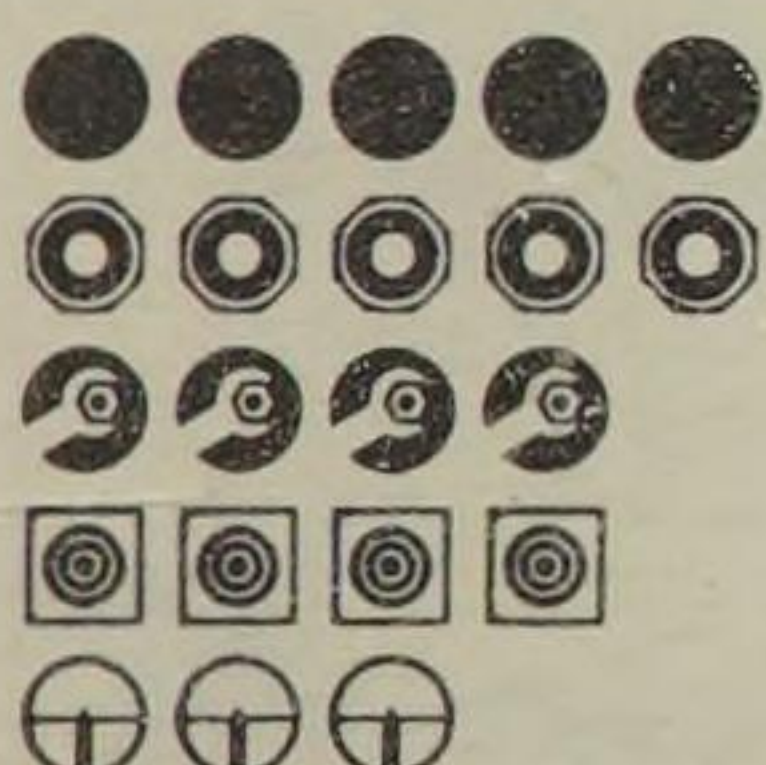


For key to parts illustrated, see manufacturer's literature



LG335

This powerful barrel-cocking rifle, incorporating the standard trigger safety, made its first appearance at the beginning of the 1970s. It was greatly revised in mid-1979, when a new stock, a cast trigger guard and an improved clutch-type barrel lock were fitted. The result is an elegant rifle displaying excellent finish and fit of wood to metal. The tunnel front sight will accept any of the standard sight elements. The pull-weight is not adjustable, but the trigger action is crisp and positive. The competitively-priced 335 is one of the few airguns that will regularly exceed 800fs (245ms) or 600fs (185ms) with some types of 0.177in and 0.22in (4.5 and 5.5mm) pellets respectively. *Type*, break-barrel spring-air rifle, positively-locked; *cl*, R1/R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,110/43.7; *bl*, 470/18.5; *rf*, 12R; *wt*, 3.38/7.44; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.



LG335S

The special target-shooting derivative of the 335 has a low-power mainspring to give a velocity nearer 600fs (185ms). Superb quality combines with low recoil and spring-surge to make an ideal beginner's target rifle, but the absence of a competition-style stock is unfortunate. The 335S is usually seen with the cheaper 6800 aperture sight, though the Anschütz 6706 may also be fitted. *Type*, break-barrel spring-air rifle, positively-locked; *cl*, M3; *cal*, 4.5/0.177; *loa*, 1,110/43.7; *bl*, 470/18.5; *rf*, 12R; *wt*, 3.38/7.44; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.

Accessories

Adjustable sling swivel (Riemenbügel), No. 6225. Locked by a screw, this slides along a rail inset in the underside of the fore-end.

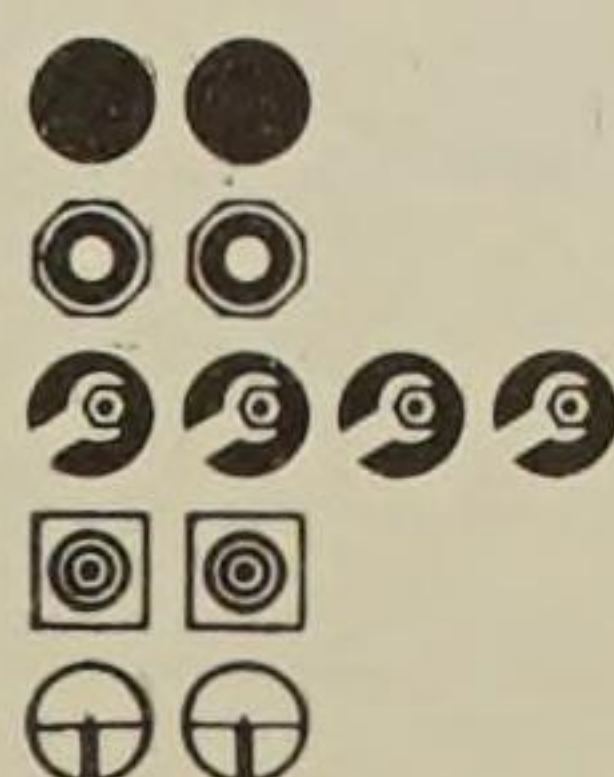
Tunnel-pattern front sight (Korntunnel), No. 6522. A standard fitting on the LG250.

Front sight inserts (Balkenkorne), No. 6522-5, in widths of 1.7, 2.0, 2.3, 2.6, 2.8, 3.4 and 3.8mm.

Aperture front sight inserts (Ringkorne) No. 6522-9, usually supplied in ten assorted sizes, but available in no less than 39 sizes from 1.7 to 5.5mm in 0.1mm increments.

Rubber eyeshield (Gummiblende), No. 6700-20.

Diopter sights. The No. 6702 is a first-class micro-adjustable aperture sight that is sometimes fitted on the LG250, a rôle that is usually filled by the similar but less complicated No. 6705. The No. 6706 or the smaller and simple No. 6800, a Williams type imported from the USA, are generally found on the LG335S. The 6800 is particularly useful in the field, as it is small and sturdy with locking screws for its settings.



Sling strap (Schiessriemen), No. 7400, for right- or left-handed marksmen. This single-loop pattern is intended for kneeling or prone shooting.

Anschütz adjustable eyepiece (Anschütz-Irisblende), No. 6771, marketed with a choice of ten different apertures, 0.9 to 2.0mm, to meet changes in light conditions. The No. 6772 Irisblende-Super is an improved and more sophisticated type.

Transparent plastic front sight inserts (Satz Kunststoff-Lochkorne), No. 6522-U14.

These, which will also fit the Feinwerkbau airguns, are available with apertures of 3.1, 3.3, 3.4, 3.5, 3.7, 3.9, 4.1 and 4.3mm.

Cleaning kit (Reinigungsgerät), No. 4412.

Two nylon brushes and a pull-through in a plastic wallet.

ARIZMENDI

Norberto Arizmendi SA (Norica), E-68 Eibar (Guipúzcoa), Avenida Bilbao, 16-Apartado, Spain. British distributor: Oliver J. Gower Ltd.; US distributor: none; Standard warranty: unknown.

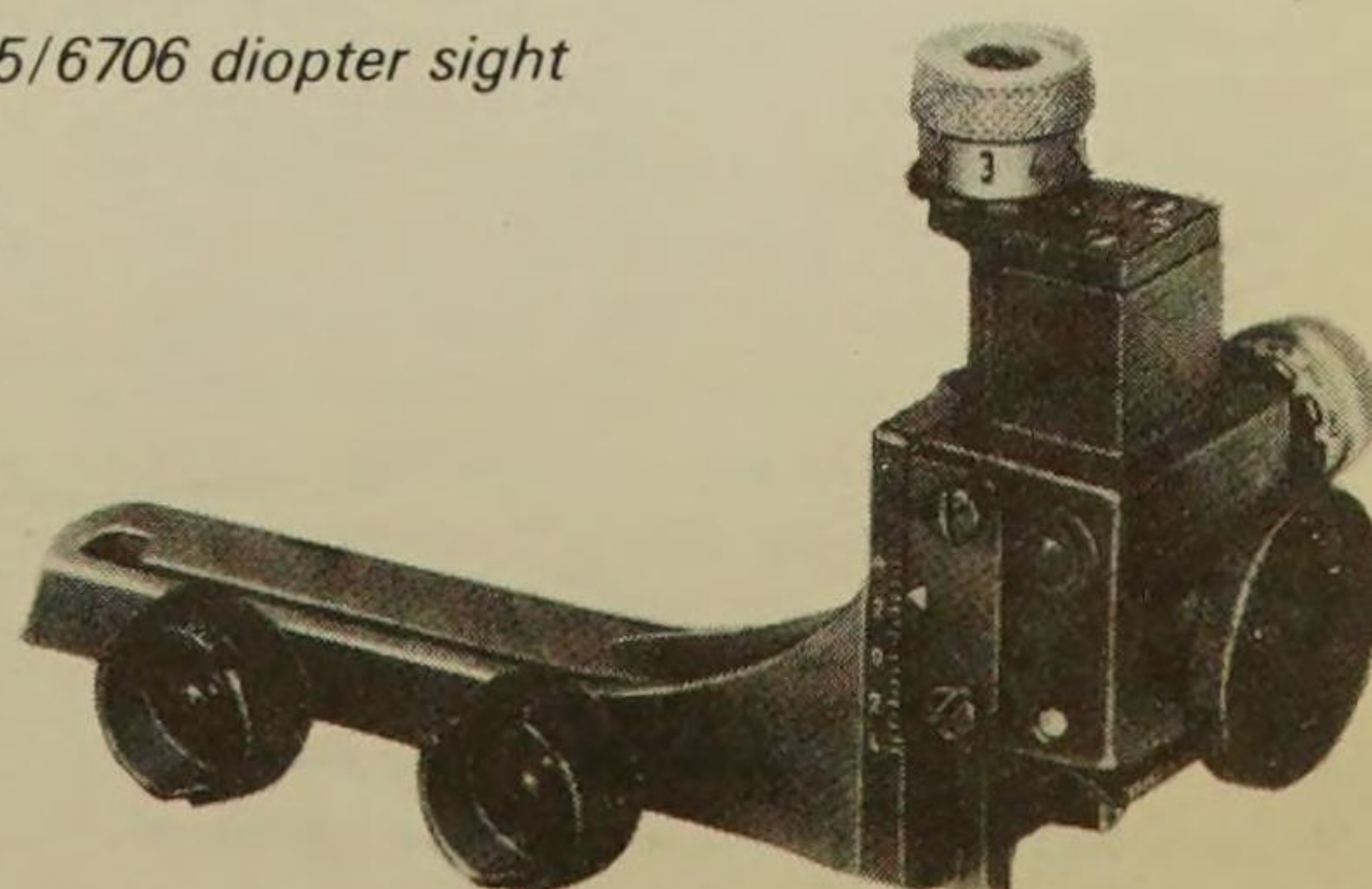
Founded in 1917, Arizmendi has a 140-strong workforce which, in addition to rifles, manufactures shotguns and motor vehicle components. Annual production of its competitively priced airguns had reached 60,000 by 1980. Its range extends from a cheap fairground gun to a more efficient mid-price semi-target rifle with an excellent adjustable trigger mechanism. Developed to share as many parts as possible, the rifles all use an unsophisticated piston assembly and have similar stiff ball or bolt detent locks.

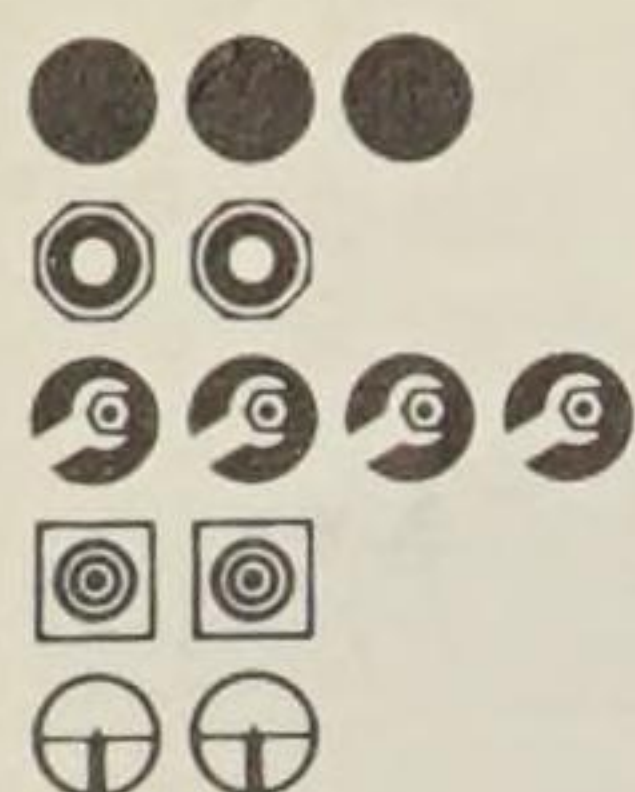
Norica Mo.61-F 'Típo Feria'

This small, unsophisticated airgun, intended for use in fairgrounds, usually has a sling ring on the barrel block and a swivel under the butt. It is cheap, but of commensurately low quality. It lacks telescope sight mounts and has a simple non-adjustable trigger. The weapon's butt, which lacks a butt-plate, makes it especially suitable for marksmen of small stature.

Type, break-barrel spring-air rifle with a detent lock (ball); *cl*, R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,030/40.6; *bl*, 450/17.7; *rf*, optional; *wt*, 2.50/5.51; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

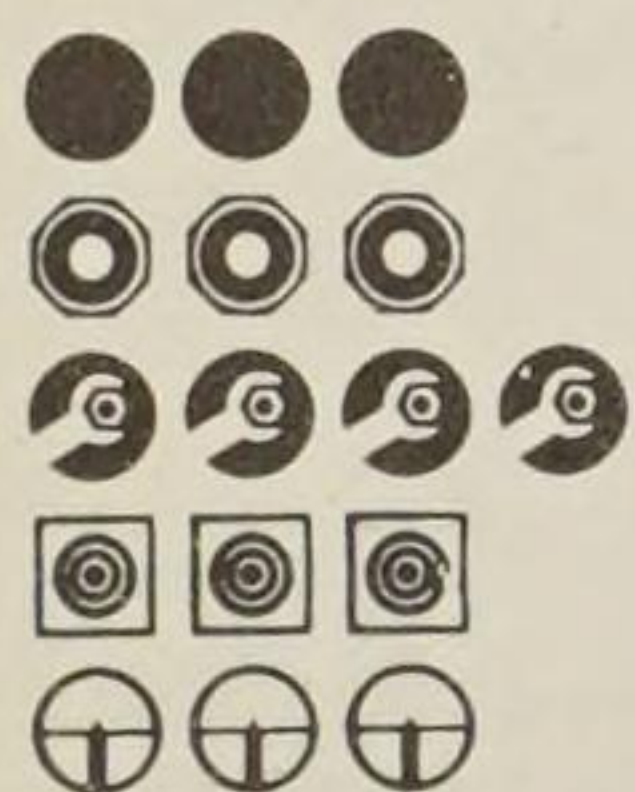
Anschütz 6705/6706 diopter sight





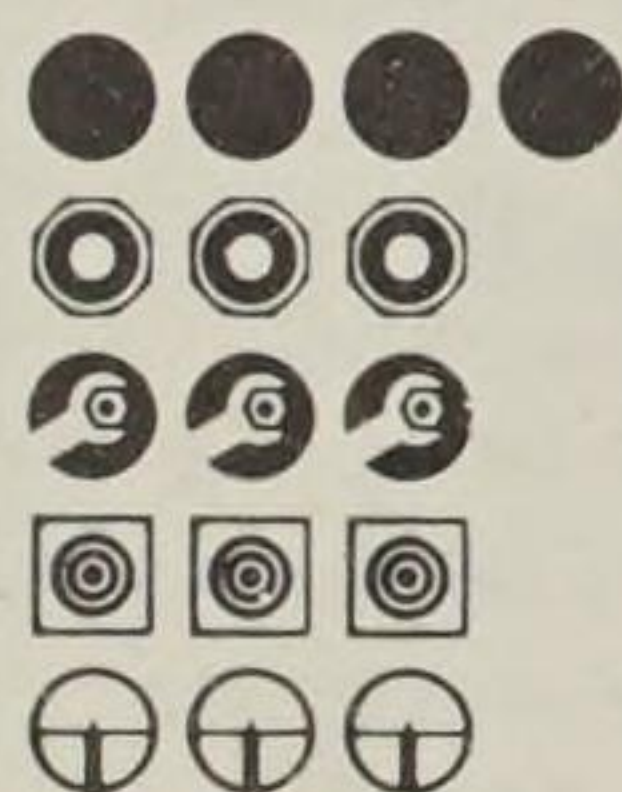
Norica Mo.61-C 'Tipo Comando' **F**

An improved Tipo Feria, the 61-C, which is often sold simply as the Comando, has an improved trigger and other detail improvements. The articulated cocking lever of the 61-F has been replaced with a sturdier one-piece type. Unfortunately, poor detent quality often makes opening the barrel difficult. The short butt still lacks a butt-plate. *Type*, break-barrel spring-air rifle with a detent lock (bolt); *cl*, R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,035/40.7; *bl*, 450/17.7; *rf*, optional; *wt*, 2.59/5.71; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.



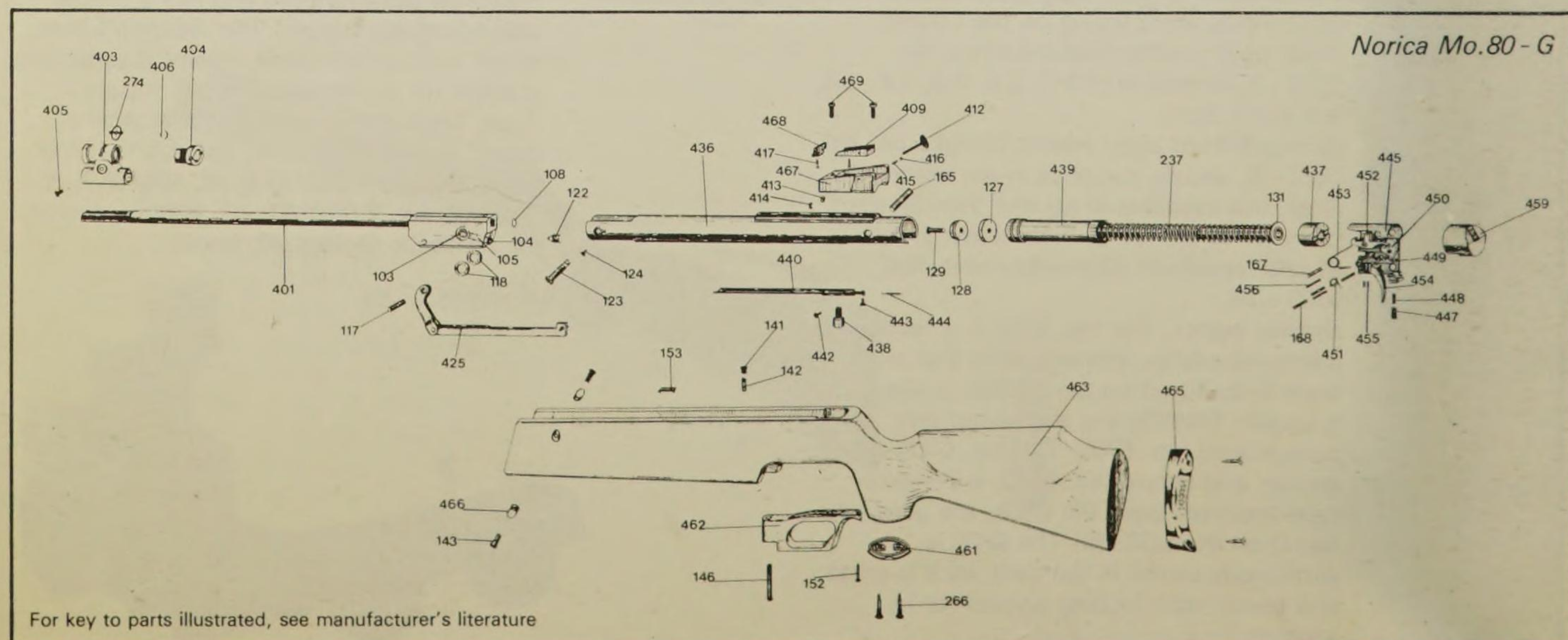
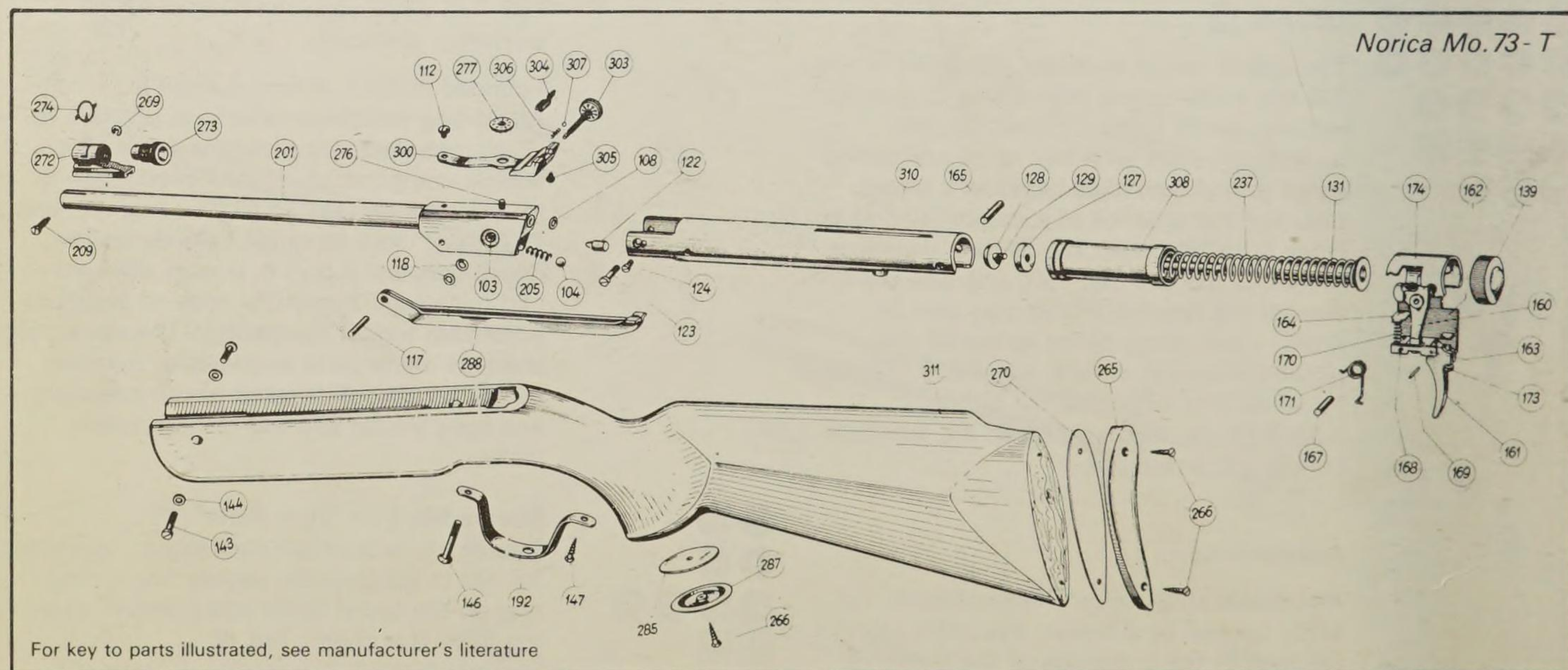
Norica Mo.73-T 'Tipo Tiro' (Phantom) **F**

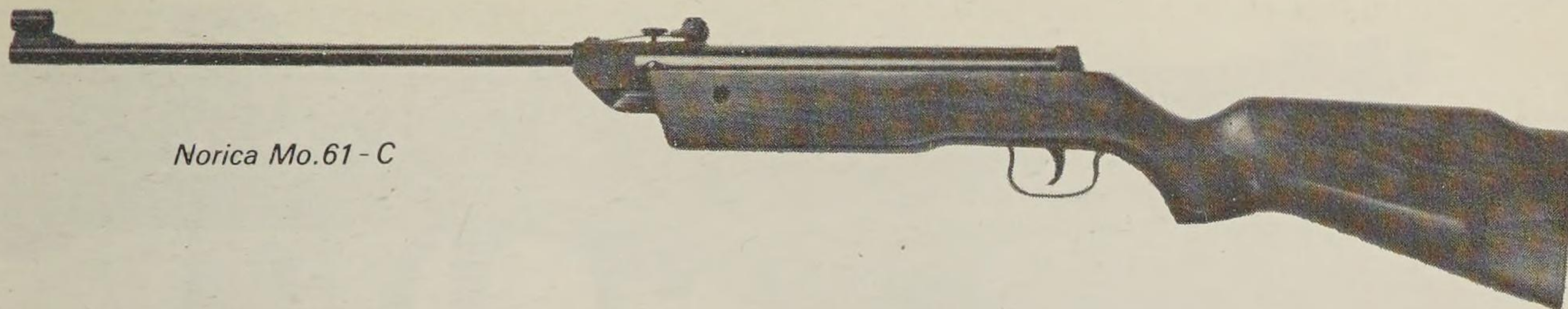
A further improvement of the basic Norica design, the 73-T has an adult-size stock with thin white spacers accompanying the butt-plate and the pistol-grip cap. There is an interchangeable-element tunnel-type front sight, while a return to the ball detent



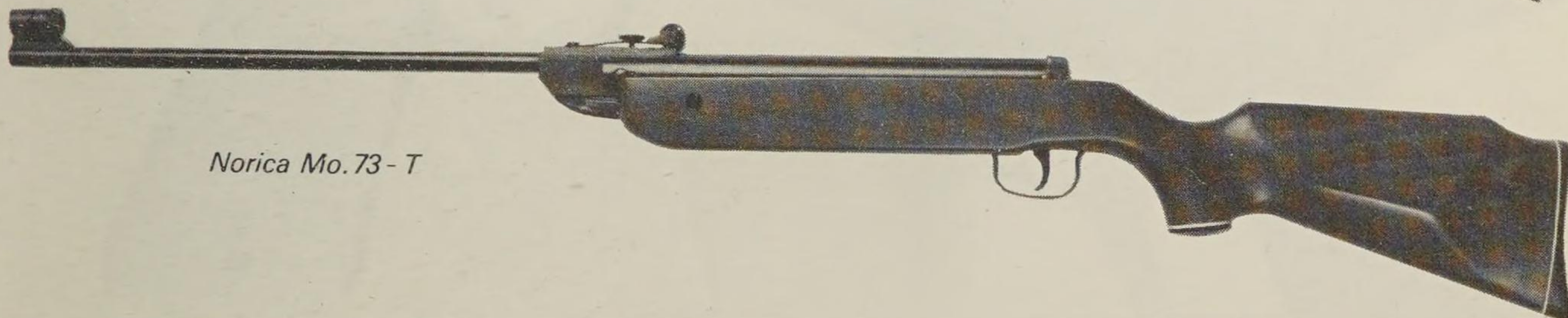
Mo.80(-C) 'Tipo de Competicion' **F**

Introduced in 1978, this perfected Arizmendi break-barrel design shares the same basic piston system of the other guns; however, it displays a very sophisticated multi-lever trigger mechanism similar to the Weihrauch Rekord pattern. The Mo.80 lacks a positive barrel lock, but has a better stock than the preceding models and an under-receiver Walther type automatic trigger-blocking safety that prevents premature piston release. The metalwork is well finished, the woodwork

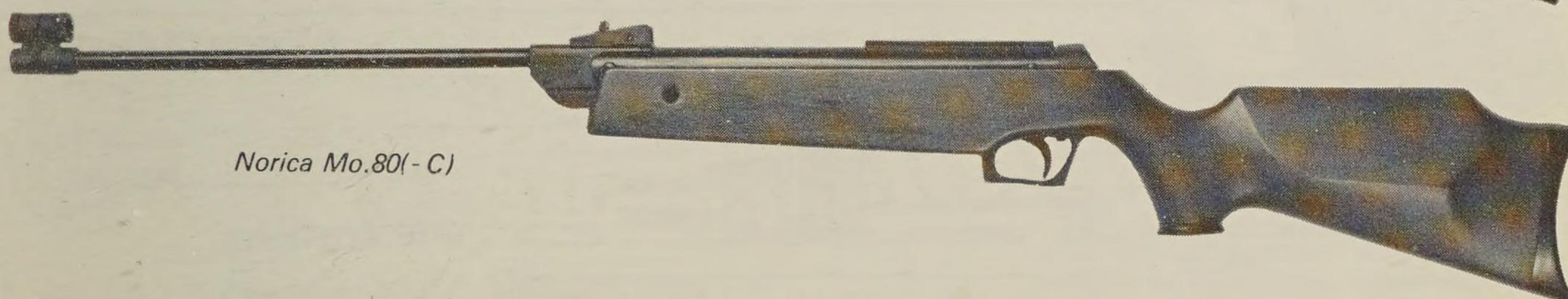




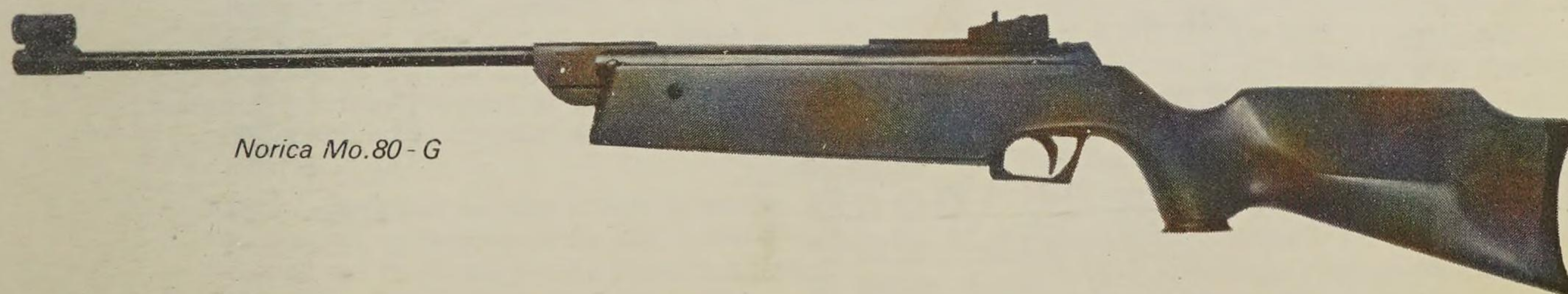
Norica Mo.61 - C



Norica Mo.73 - T



Norica Mo.80(- C)



Norica Mo.80 - G

(particularly the stock inletting) much less so. There is also a great deal of plastic in its construction and a very curious back sight with an idiosyncratic slider and inclined-plane elevation system. The Mo.80 is a little too light for serious competition shooting and, perhaps, a little too low-powered for field-work. *Type*, break-barrel spring-air rifle with a detent lock (ball); *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,090/42.9; *bl*, 455/17.9; *rf*, 10R?; *wt*, 3.10/6.83; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.

Norica Mo.80-G 'Tipo de Gran Competicion'

The 80-G is simply an 80-C with a deeper and heavier stock. It is usually found with a curious aperture sight on top of the receiver, though the essentially similar standard open pattern can be attached to the barrel block if required. It is competitively priced, but needs a better back sight (original Diana or Anschütz sights fit, but they increase the cost) for serious target shooting. Additional weight would help to mask the effects of recoil and spring-surge, as would a rubber butt-plate

rather than the hard plastic one at present fitted — particularly as the pleasant handling and sophisticated trigger of the 80-G is eminently suited to target use.

Type, break-barrel spring-air rifle with a detent lock (ball); *cl*, R3:M3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,090/42.9; *bl*, 455/17.9; *rf*, 10R?; *wt*, 3.30/7.28; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.

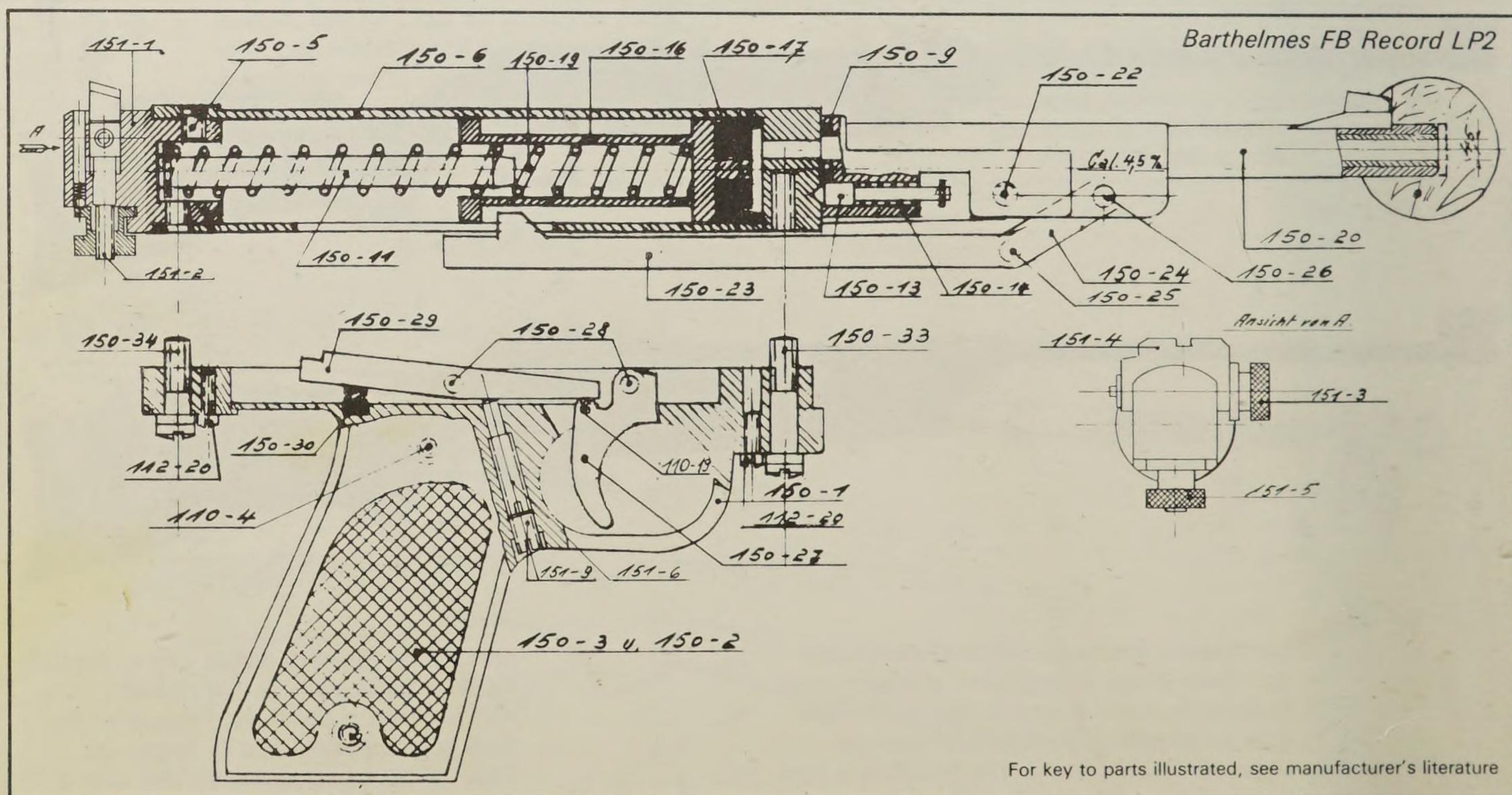
Accessories: Norica Mo. 73-T, 80 (80-C) and 80-G

Many optional front-sight inserts may be obtained, several of which are usually supplied with each gun (in a small, green, plastic wallet). They include ring-type sights, the *Anillo* 2.5, 3 and 3.5mm; the *Angular* 0.50, a tapered-post element with a ½mm wide tip; the *Perla* 2mm, a 2mm diameter bead; and the *Tablón* 2.5mm, a 2.5mm wide post. The standard 'open' sight, standard on the Mo. 80 and often also seen on the Mo. 80-G, has a multi-notch rotating plate giving a choice of square, U and narrow or broad V sight pictures. Several other types of sight may be obtained to special order.

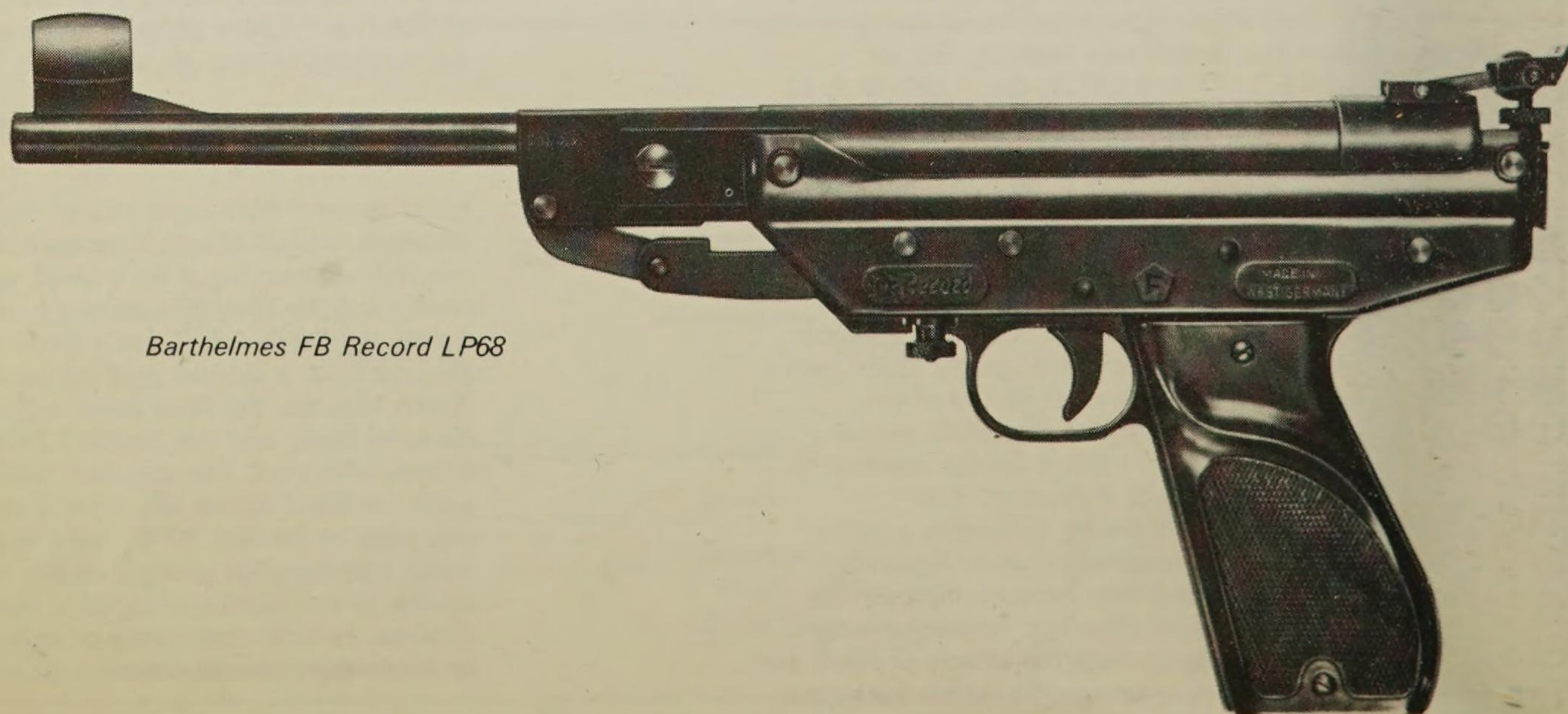




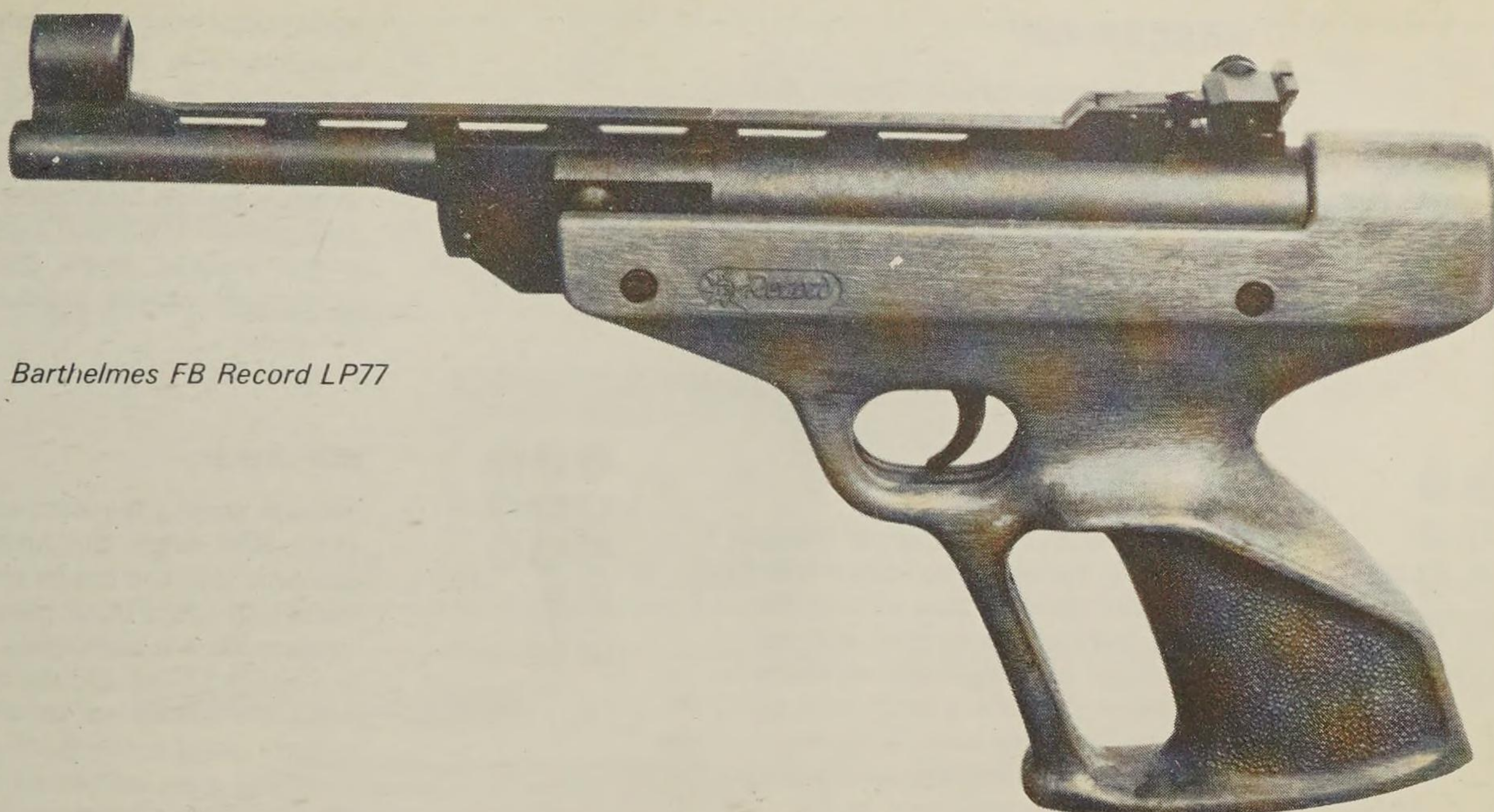
Barthelmes FB Record LP2



For key to parts illustrated, see manufacturer's literature



Barthelmes FB Record LP68



Barthelmes FB Record LP77

BARTHELMES

Fritz Barthelmes KG, Sportwaffenfabrik (FB Record), D – 7920 Heidenheim-Oggenhausen, Watzmannstrasse 17, West Germany. British distributor: John Rothery & Co. Ltd. (not airguns, as yet); US distributor: none; Standard warranty: 12 months.

This business was founded in 1948 by Fritz Barthelmes, co-designer of the P38, and is now owned by his son Martin. Production of starting and signal pistols began in 1954, followed by airguns in the late 1960s. 60 per cent of an annual production of 40,000 well made air pistols, characterized by low-cost alloy-based construction, was exported in 1979. This figure seems all the more impressive when one considers that the workforce numbers a mere 20 men.

FB Record LP1

This interesting pistol, made almost entirely of low-cost alloy castings, is rarely seen outside Germany. Considerable design skill is evident in its construction; the piston assembly, the non-adjustable two-stage trigger/sear system and the cocking mechanism are better than many competing designs. The rifled LP2, however, is a better buy. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P5; *cal*, 4.5/0.177; *loa*, 270/10.6; *bl*, 130/5.1; *rf*, none; *wt*, 0.68/1.49; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

FB Record LP2

This rifled version of the LP1 has a two-stage trigger with an adjustable sear and a surprisingly good micro-adjustable back sight, controlled by knurled-head drums, in a housing milled out of the air cylinder

plug. The LP2 is a much better buy than many of its competitors. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P5; *cal*, 4.5/0.177; *loa*, 295/11.6; *bl*, 130/5.1; *rf*, 12R?; *wt*, 0.73/1.60; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

FB Record LP68

This interesting, large dual-purpose sporting/target pistol is sturdily made from low-cost stampings. It has an adjustable two-stage double pressure trigger and micro-adjustable sights, with the fixed front sight lying in a protective tunnel. The LP68 is heavy and quite low-powered, giving minimal recoil and spring-surge effects. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, C3:P3; *cal*, 4.5/0.177; *loa*, 365/14.4; *bl*, 180/7.1; *rf*, 12R?; *wt*, 1.32/2.91; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

FB Record LP77

The curious plastic grip/frame unit distinguishes this gun, a potentially good low-cost target pistol, though the grip does not meet some ISU and other regulations. The LP77 has a good and simple trigger-blocking safety, an adjustable two-stage trigger and a unique ventilated rib above the barrel. Its sights are not as easy to use as those of the LP68, while firers with large fingers may find the grip uncomfortable. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, C3:P3; *cal*, 4.5/0.177; *loa*, 315/12.4; *bl*, 150/5.9; *rf*, 12R?; *wt*, 0.90/1.98; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.

BASCARAN

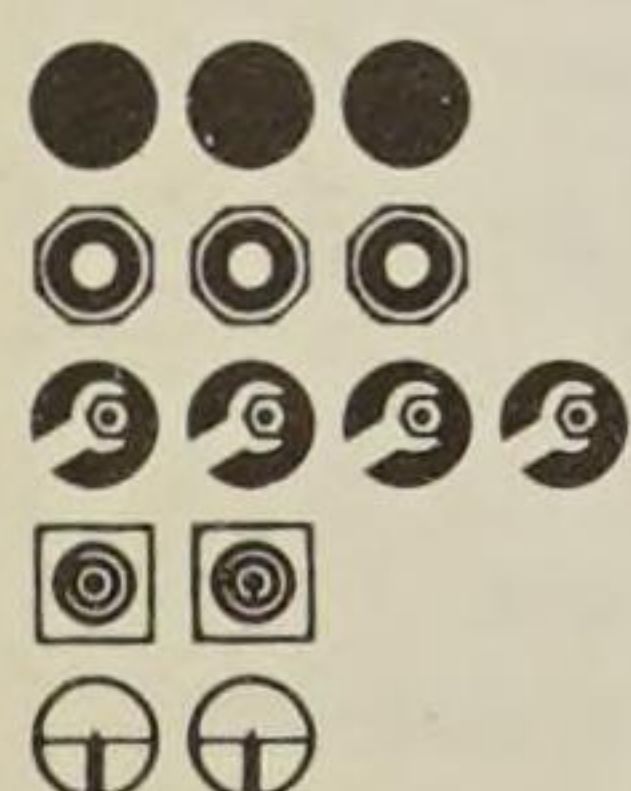
C. y T. Bascaran SRC (Cometa), E-68 Eibar (Guipúzcoa), Chonta 26, Spain. British distributor: none; US distributor: none; Standard warranty: unknown.

The products of this small company, founded in 1937, are only occasionally seen in Britain. A few Cometa rifles were imported by Parker-Hale Ltd in 1976–77, but the quality was so poor that distribution ceased.



Cometa V

The unsophisticated design of this gun is reflected in its low cost; trigger travel can be adjusted roughly by a plate in the breech, but not pull-weight, and the tangent-leaf back sight has no lateral adjustment. There is a bead front sight, an articulated cocking lever, sling rings/swivels and a short junior-style butt. The Cometa frequently needs attention, as the metalwork is often quite rough internally. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 990/39.0; *bl*, 405/16.0; *rf*, optional; *wt*, 2.28/5.03; *ps*, leather washer; *bs*, O-ring; *sft*, none.



Cometa VII

This improved Cometa V has a separate sear, giving a better trigger pull; the front sight is a replaceable-element type, the back sight is fully adjustable and there are telescope sight rails on the air cylinder. There is also a separate rubber butt-plate and a slight Monte Carlo comb. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 995/39.2; *bl*, 405/16.0; *rf*, optional; *wt*, approx. 3.0/6.6; *ps*, leather washer; *bs*, O-ring; *sft*, none.

BSF

Bayerische Sportwaffenfabrik Hans Schütt oHG (BSF), D-7938 Erlangen/Bayern, Fuchsgarten 1 1/2, West Germany. UK distributor: Norman May & Co.; US distributors: Air Rifle Headquarters, Beeman's Precision Airguns; Standard warranty: 12 months.

BSF was founded in 1935 and made a few airguns prior to the outbreak of the Second

World War. Production of barrel-cocking and underlever designs, sturdy but somewhat unsophisticated, recommenced in 1948 and still continues. Many guns are encountered with the Wischo brand-name, which is owned by Wilsker & Co. of Erlangen, an important exporter/distributor of BSF's wares. About 130 people are currently employed, producing 20,000 guns per annum.

BSF Junior

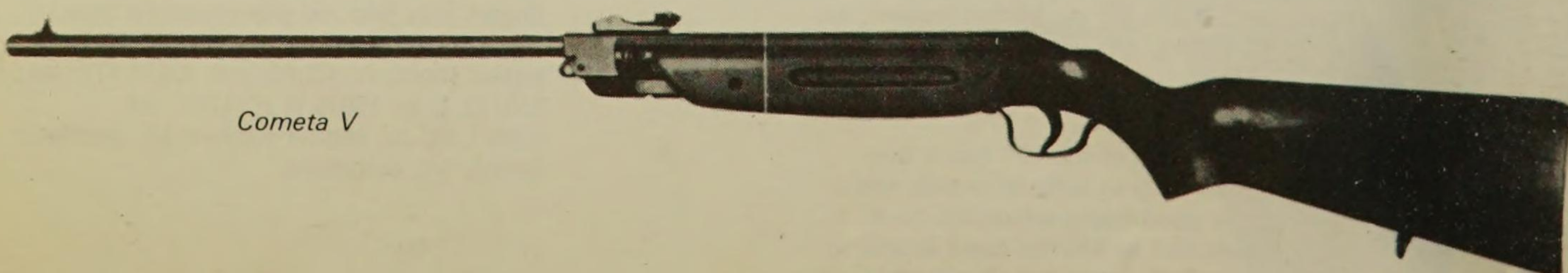
Though among the least sophisticated guns in the BSF range, the Junior is well made and finished. The beech stock displays a pistol grip and a black plastic butt-plate, the cocking lever is articulated, the front sight is a hooded bead and the back sight an adjustable spring-leaf pattern. The trigger is a single stage non-adjusting design. A telescope sight rail lies on top of the receiver. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R5; *cal*, 4.5/0.177; *loa*, 960/37.8; *bl*, 410/16.1; *rf*, N/A; *wt*, 2.00/4.41; *ps*, leather washer; *bs*, synthetic or rubber O-ring; *sft*, none.

BSF Media

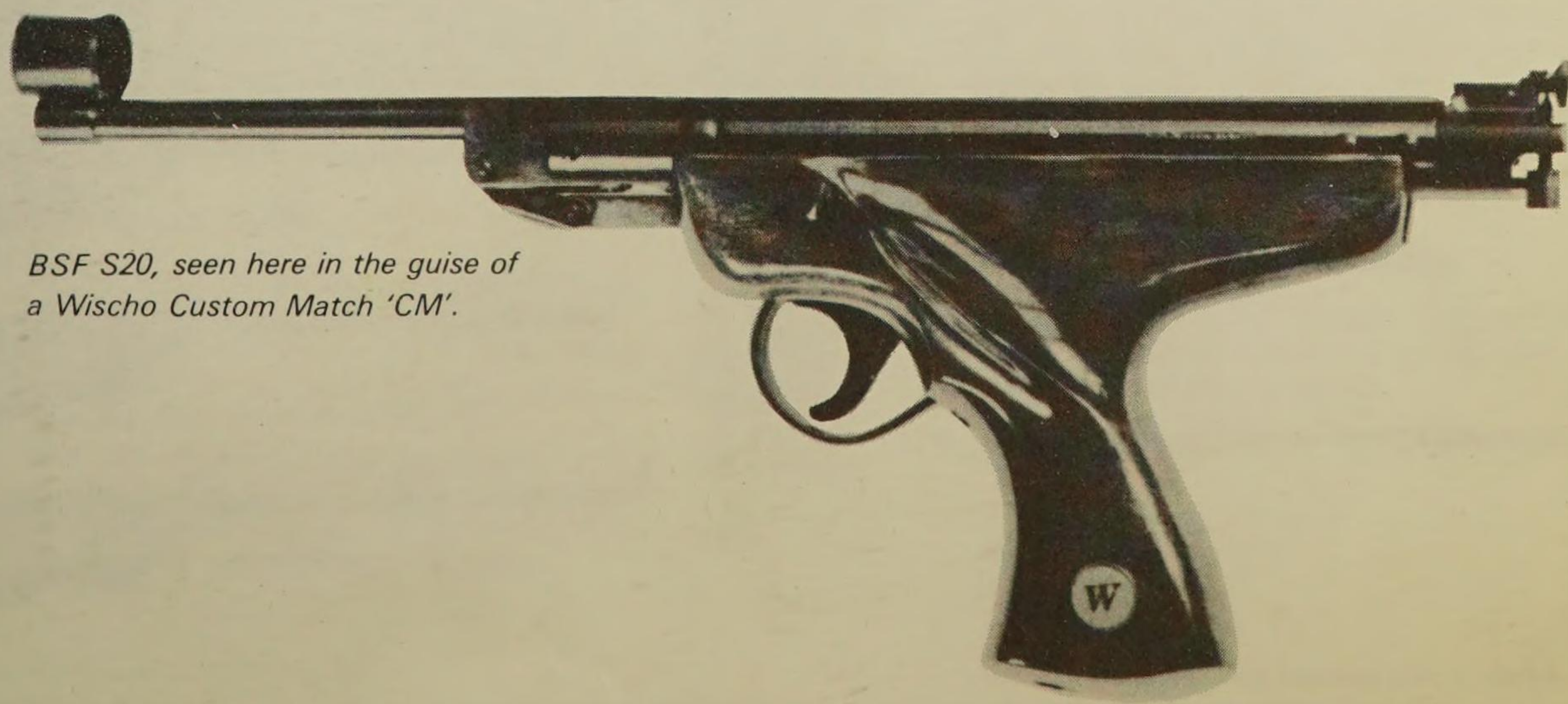
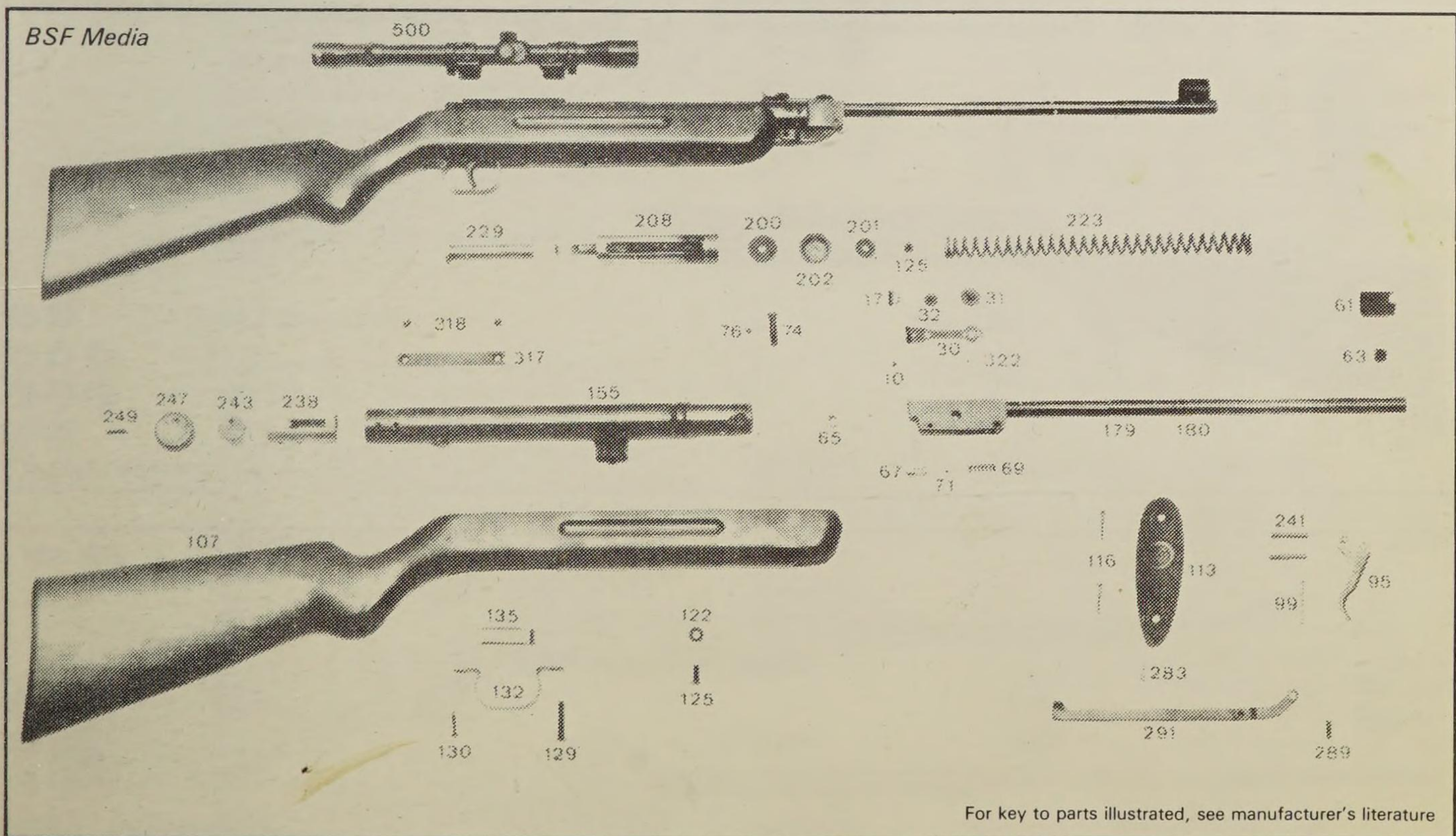
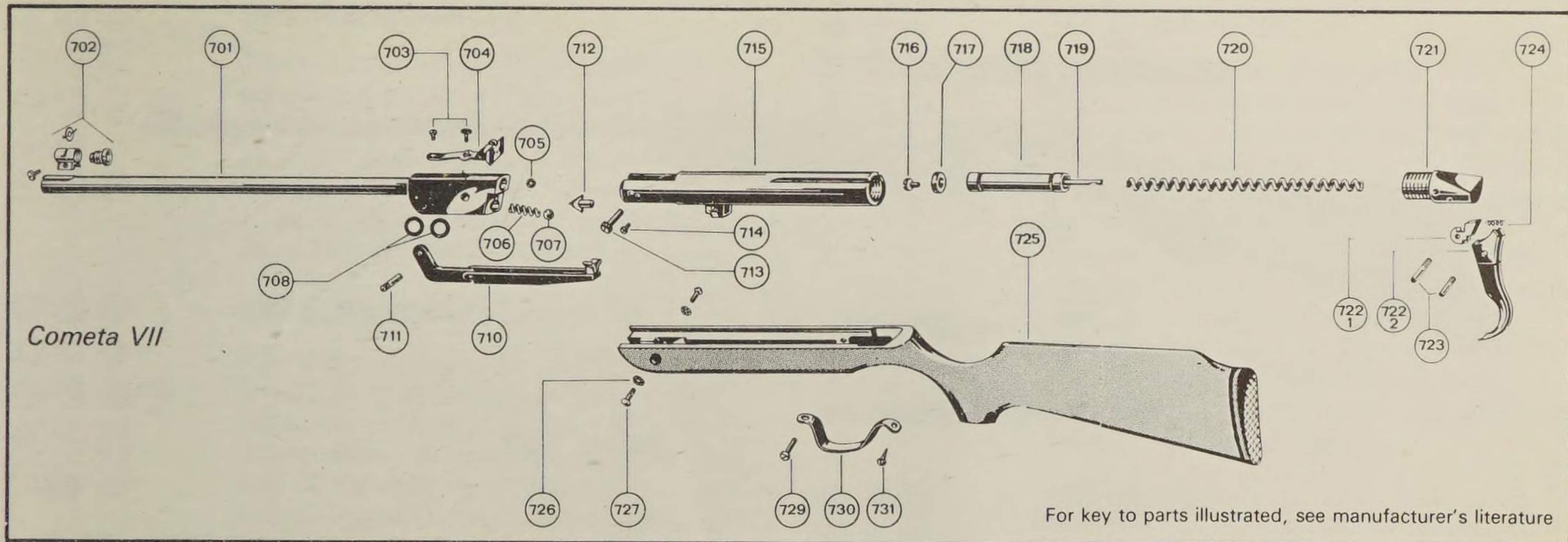
The Media shares many parts (trigger and sights, for example) with the smaller Junior, though the receiver is bigger, the stock longer and the mainspring more powerful. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3/R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,000/39.4; *bl*, 430/16.9; *rf*, N/A; *wt*, 2.55/5.62; *ps*, leather washer; *bs*, synthetic or rubber O-ring; *sft*, none.

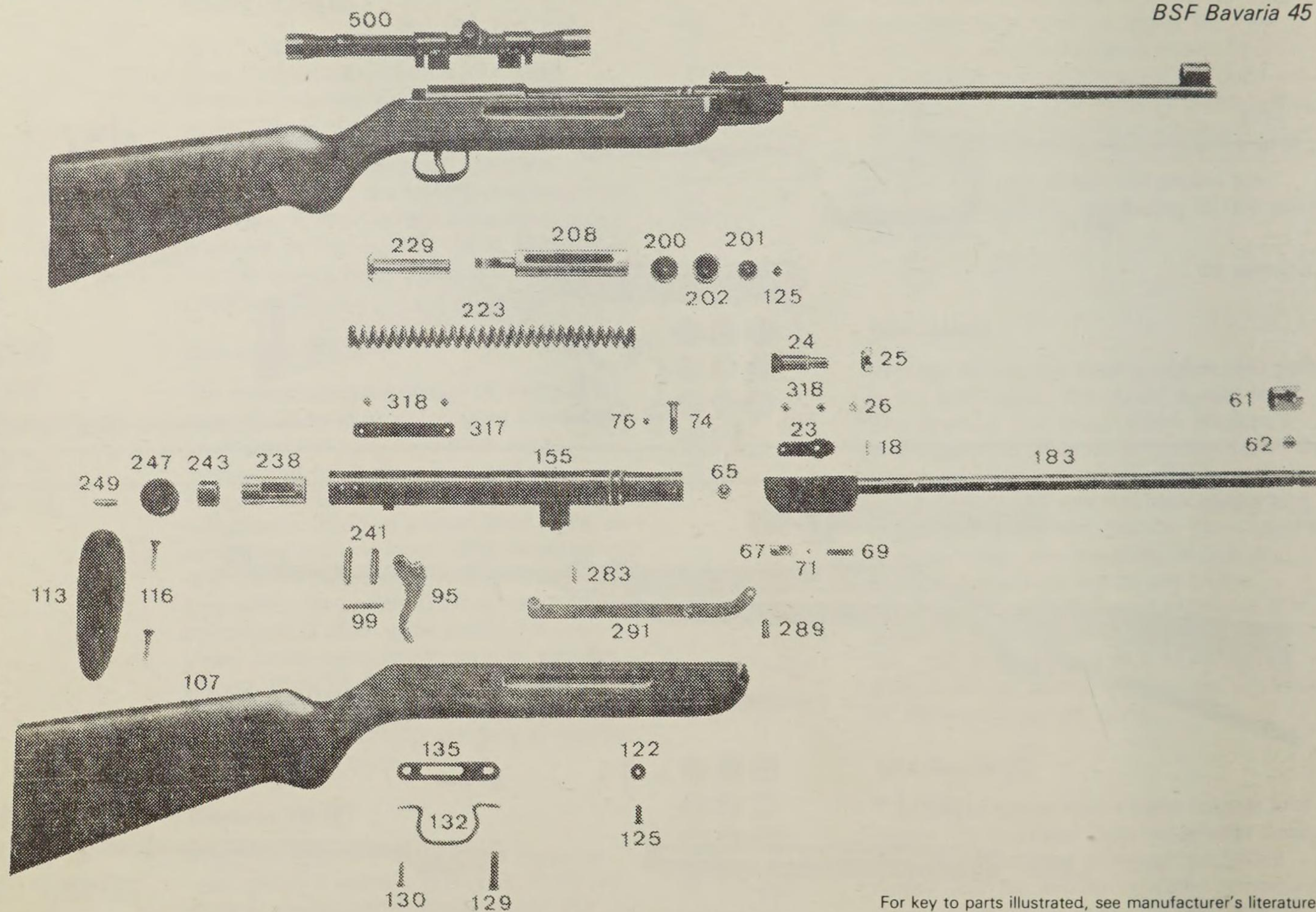
BSF S20

The solitary BSF pistol is simply a small rifle, with an articulated cocking lever and standard piston train. Its two-stage trigger, adjusted by a screw behind the grip, is factory-set at about 1.7kg (3.7lb) and there is an open tangent-leaf back sight. The plain walnut or beech grip lacks a thumb-rest. The S20 is powerful but rather difficult to cock, as the firer's hand is easily caught on the front sight and the short barrel gives poor leverage. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P2/P3; *cal*, 4.5/0.177; *loa*, 370/14.6; *bl*, 175/6.9; *rf*, N/A; *wt*, 1.10/2.43; *ps*, leather washer; *bs*, rubber or synthetic O-ring; *sft*, none.

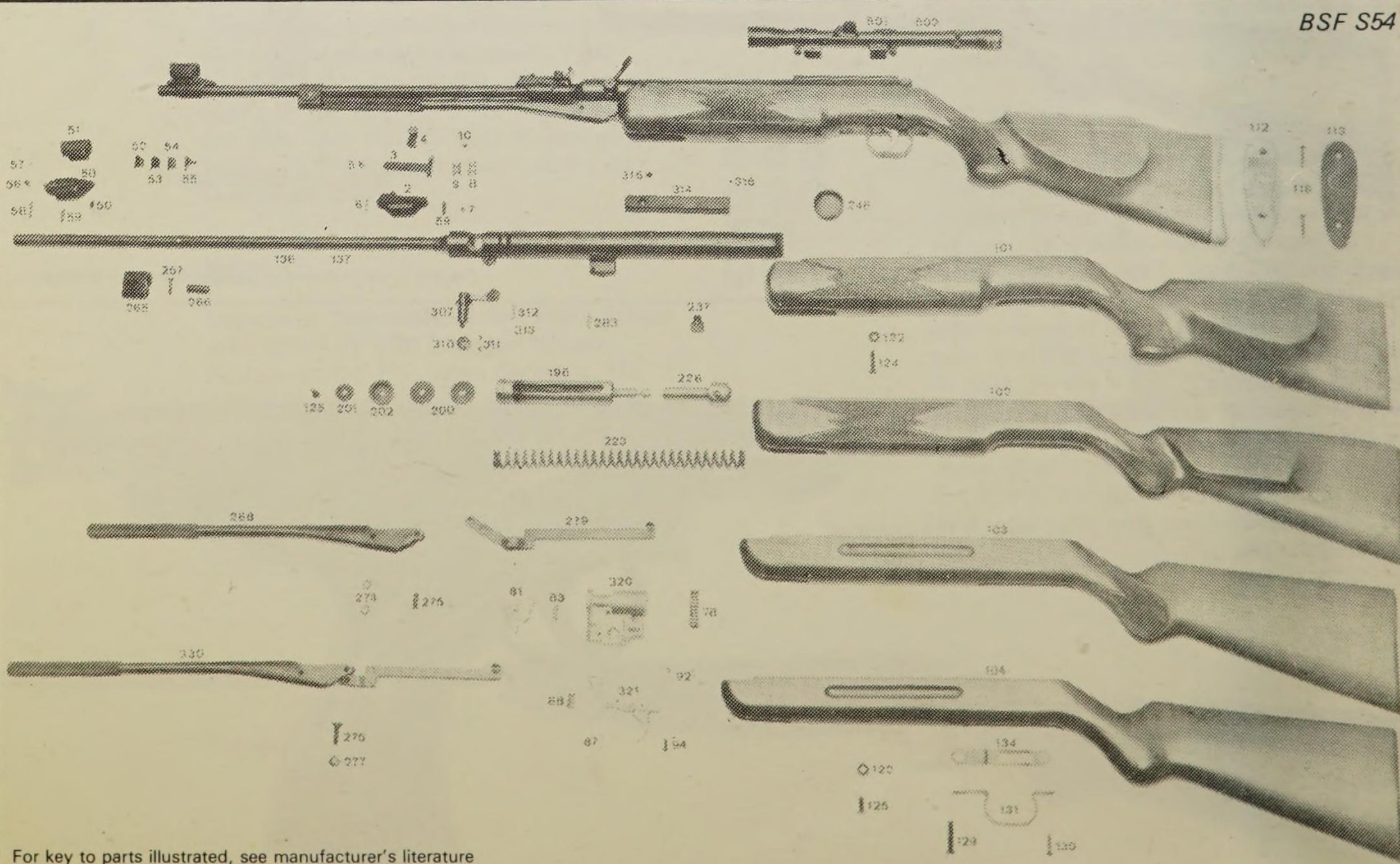


Cometa V





For key to parts illustrated, see manufacturer's literature

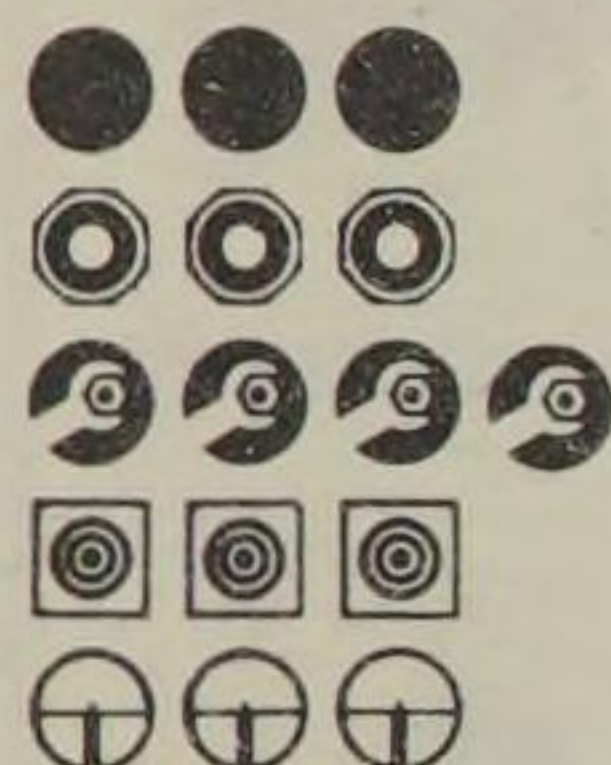


For key to parts illustrated, see manufacturer's literature



BSF S20E (Export)

This is the standard S20, supplied in a carton and accompanied by a cleaning rod and some pellets. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P2/P3; *cal*, 4.5/0.177; *loa*, 370/14.6; *bl*, 175/6.9; *rf*, N/A; *wt*, 1.10/2.43; *ps*, leather washer; *bs*, rubber or synthetic O-ring; *sft*, none.



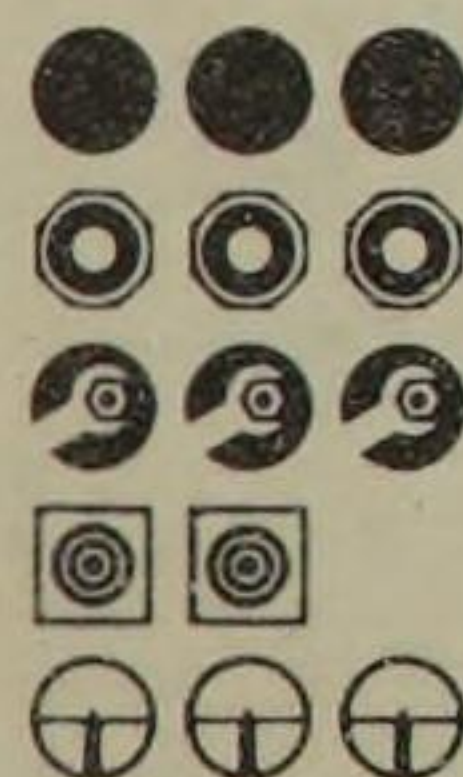
BSF S20ME (Match Export)

This improvement of the S20 incorporates a special air-cylinder plug carrying a micro-adjustable back sight which is controlled by drums under the cylinder and on the right side of the sight block. The walnut butt has a well shaped thumb-rest. New guns will be found with a hooded bead front sight that allows an easier cocking stroke, as the firer's hand may grasp the muzzle without catching the sight. The S20ME is powerful and quite popular, but its design is somewhat dated. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, C3:P2/P3; *cal*, 4.5/0.177; *loa*, 402/15.8; *bl*, 175/6.9; *rf*, N/A; *wt*, 1.25/2.76; *ps*, leather washer; *bs*, rubber or synthetic O-ring; *sft*, none.



BSF Bavaria 30

This simple, child's gun – well made though it is – offers few advantages and is rarely seen outside Germany. It has a well shaped pistol grip stock, an articulated cocking lever system, a simple open front sight, a spring-leaf back sight and a non-adjusting trigger. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R5; *cal*, 4.5/0.177; *loa*, 870/34.3; *bl*, 370/14.6; *rf*, N/A; *wt*, 1.55/3.42; *ps*, leather washer; *bs*, synthetic or rubber O-ring; *sft*, none.



BSF Bavaria 35

This is simply a Media with a stronger, improved tangent-leaf back sight adjustable for elevation only. It is well made, but relatively expensive. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4/R3; *cal*, 4.5/0.177; *loa*, 990/39.0; *bl*, 435/17.1; *rf*, N/A; *wt*, 2.10/4.63; *ps*, leather washer; *bs*, synthetic or rubber O-ring; *sft*, none.



BSF Bavaria 45

An adult version of the mechanically identical Bavaria 35/Media rifle, this offers few real advantages over its cheaper rivals, apart from the quality and solidity of its construction. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177; *loa*, 1,080/42.5; *bl*, 485/19.1; *rf*, N/A; *wt*, 2.68/5.91; *ps*, leather washer; *bs*, synthetic or rubber O-ring; *sft*, none.



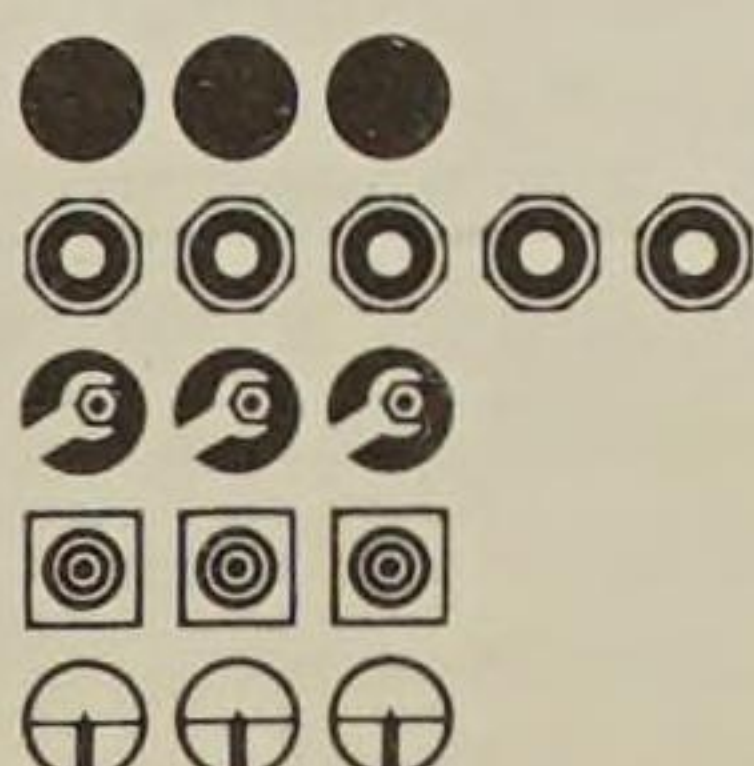
BSF Bavaria 50

The deluxe version of the Bavaria 45 features a micro-adjustable back sight – controlled by a disc on the sight leaf and a drum on the right side of the sight block – and a higher quality beech stock, displaying a cheekpiece and a Monte Carlo comb. There is usually a grasping groove in the fore-end, though chequering is occasionally seen. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177; *loa*, 1,080/42.5; *bl*, 485/19.1; *rf*, N/A; *wt*, 2.90/6.39; *ps*, leather washer; *bs*, synthetic or rubber O-ring; *sft*, none.



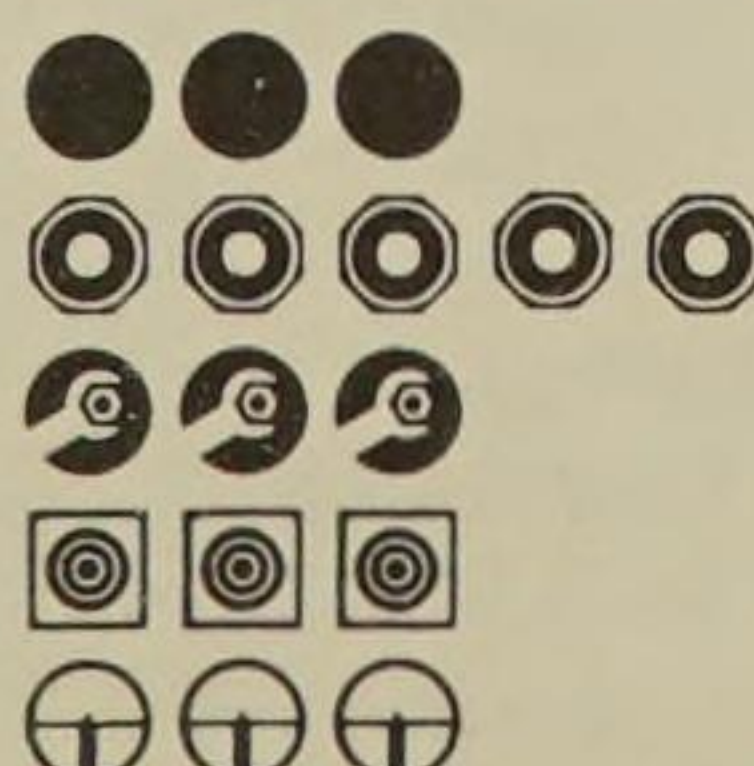
BSF S54

This is a well made traditional underlever rifle design, much admired in some quarters but mechanically similar to the S60 and S70. Its unusual features include the articulated underlever system and optional front sights: bead, barleycorn, blade and ring. Most guns, however, have open tangent-leaf back sights that cannot be adjusted laterally. The standard beech stock has a plain rounded pistol grip, no cheekpiece and a simple plastic butt-plate. *Type*, fixed barrel underlever-cocking spring-air rifle, loaded through a rotary port; *cl*, R3/R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,150/45.3; *bl*, 485/19.1; *rf*, N/A; *wt*, 3.65/8.05; *ps*, leather washer; *sft*, none.



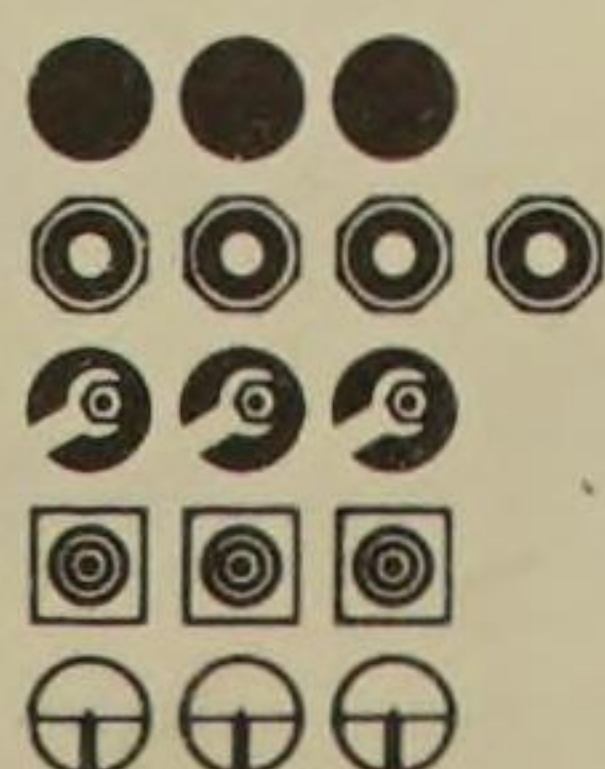
BSF S54B (Bayernschaft)

This variant of the S54 has a walnut stock with a deep chequered fore-end, a rounded chequered pistol grip and a distinctive squared Bavarian-style cheekpiece. In addition, it has a more impressive butt-plate. *Type*, fixed-barrel underlever cocking spring-air rifle, loaded through a rotary port; *cl*, R3/R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,160/45.7; *bl*, 485/19.1; *rf*, N/A; *wt*, 3.73/8.22; *ps*, leather washer; *sft*, none.



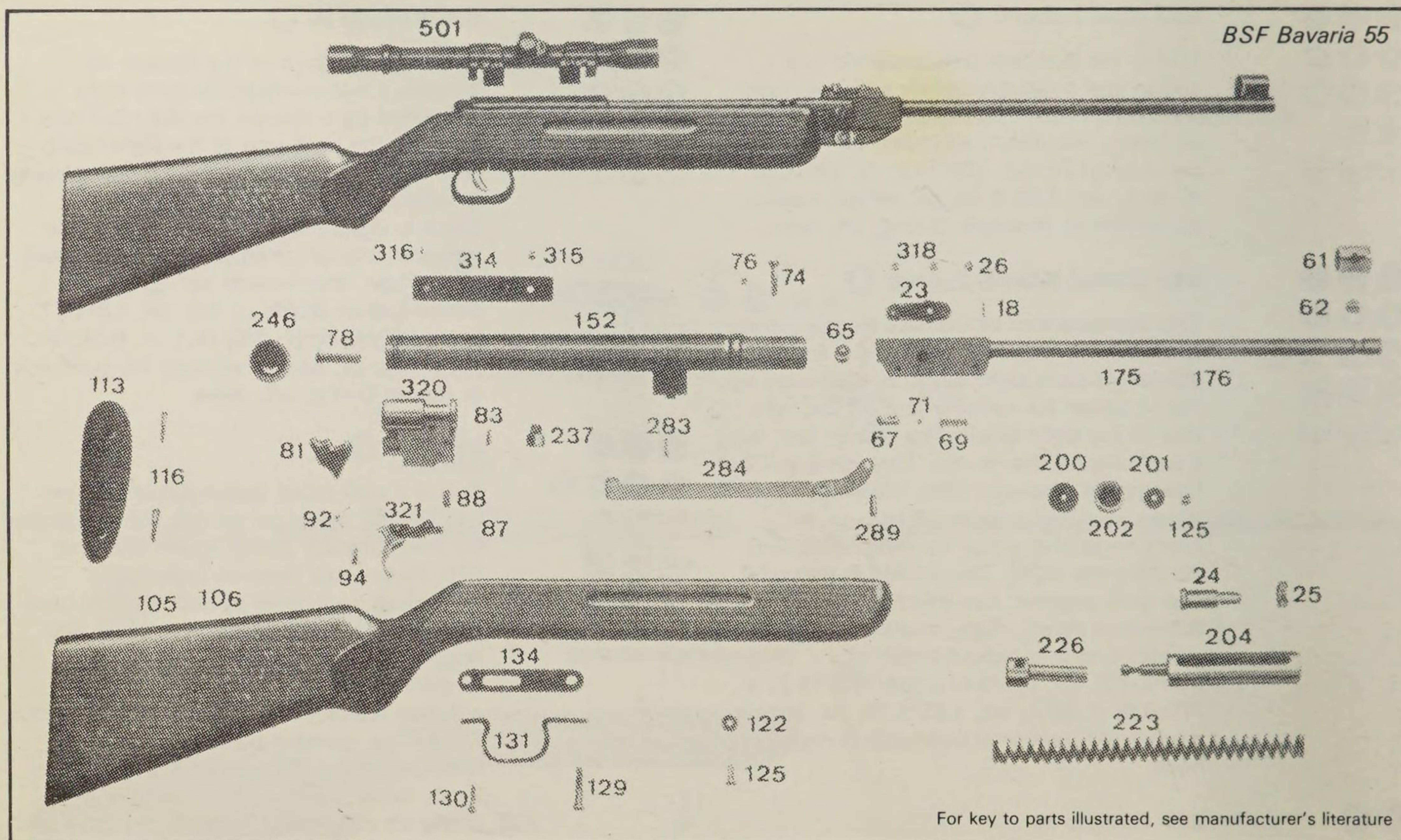
BSF S54M (Match)

This S54 is very similar to the Bayernschaft type, but has a more conventional rounded cheekpiece and a squarer-cut pistol grip. Like the Bavarian rifle, it offers good quality at a commensurately high price. See S54B for details.

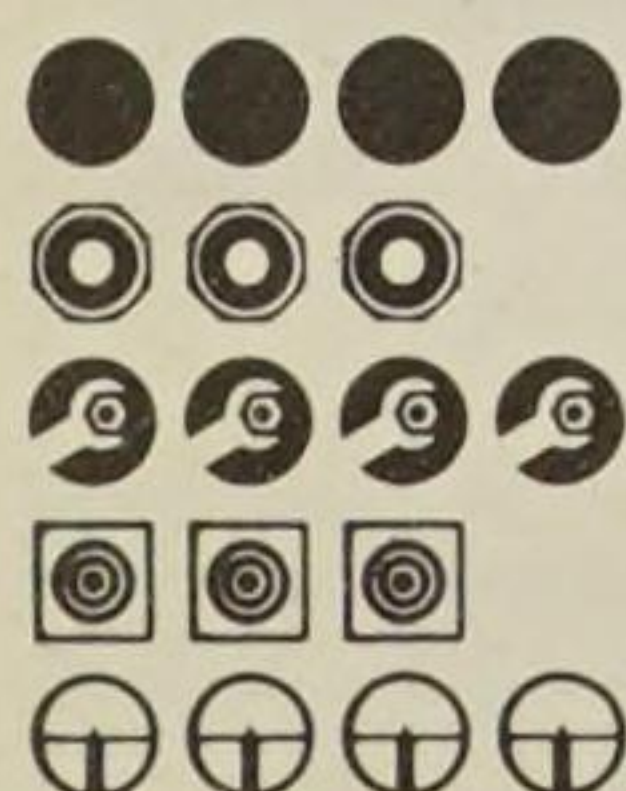


BSF S54N (Nussbaumschaft)

A minor variant of the standard S54, with a walnut (Nussbaum) stock and a chequered pistol grip. See S54 for details.

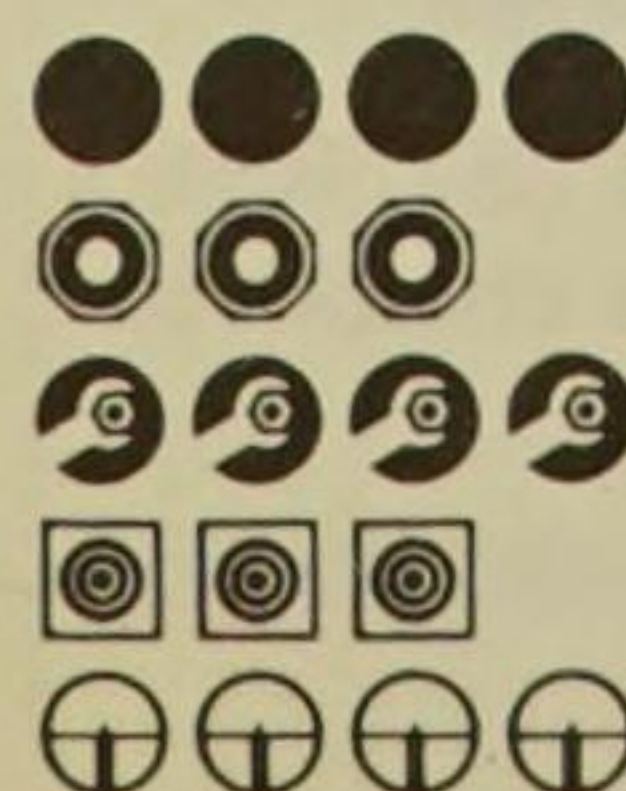


For key to parts illustrated, see manufacturer's literature



BSF Bavaria 55

The 55 has a well-designed three-stage trigger system giving a crisp pull adjustable to about 1.4kg (3lb) once 'run-in'. Most of the remaining features are shared with the 35,45 and other rifles, however. Older guns may be encountered with tangent-leaf back sights adjustable only for elevation, but newer ones – late 1978/early 1979 onward – have additional drum-controlled lateral adjustments. The Bavaria 55 is light, handy and powerful, but a powerful mainspring and the poor leverage afforded by the short barrel make cocking tiring. Muzzle velocity will exceed 770fs (235ms) with some types of 4.5/0.177 pellet, or 575fs (175ms) with 5.5/0.22. Though somewhat expensive, the 55 is well liked as a handy 'field-gun'. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,030/40.6; *bl*, 410/16.1; *rf*, N/A; *wt*, 2.89/6.37; *ps*, leather washer; *bs*, rubber or synthetic O-ring; *sft*, none.



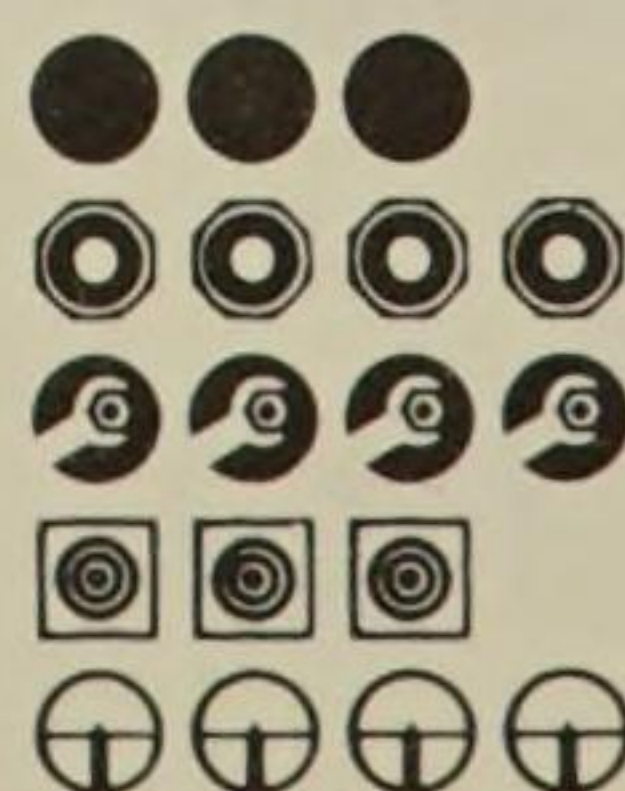
BSF Bavaria 55DL

A deluxe Bavaria 55, this displays a walnut stock with a chequered pistol grip and fore-end (which may, alternatively, have a grasping groove), a rubber butt-plate with a white spacer, a cheekpiece and a Monte Carlo comb. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,040/40.9; *bl*, 410/16.1; *rf*, N/A; *wt*, 3.10/6.84; *ps*, leather washer; *bs*, rubber or synthetic O-ring; *sft*, none.



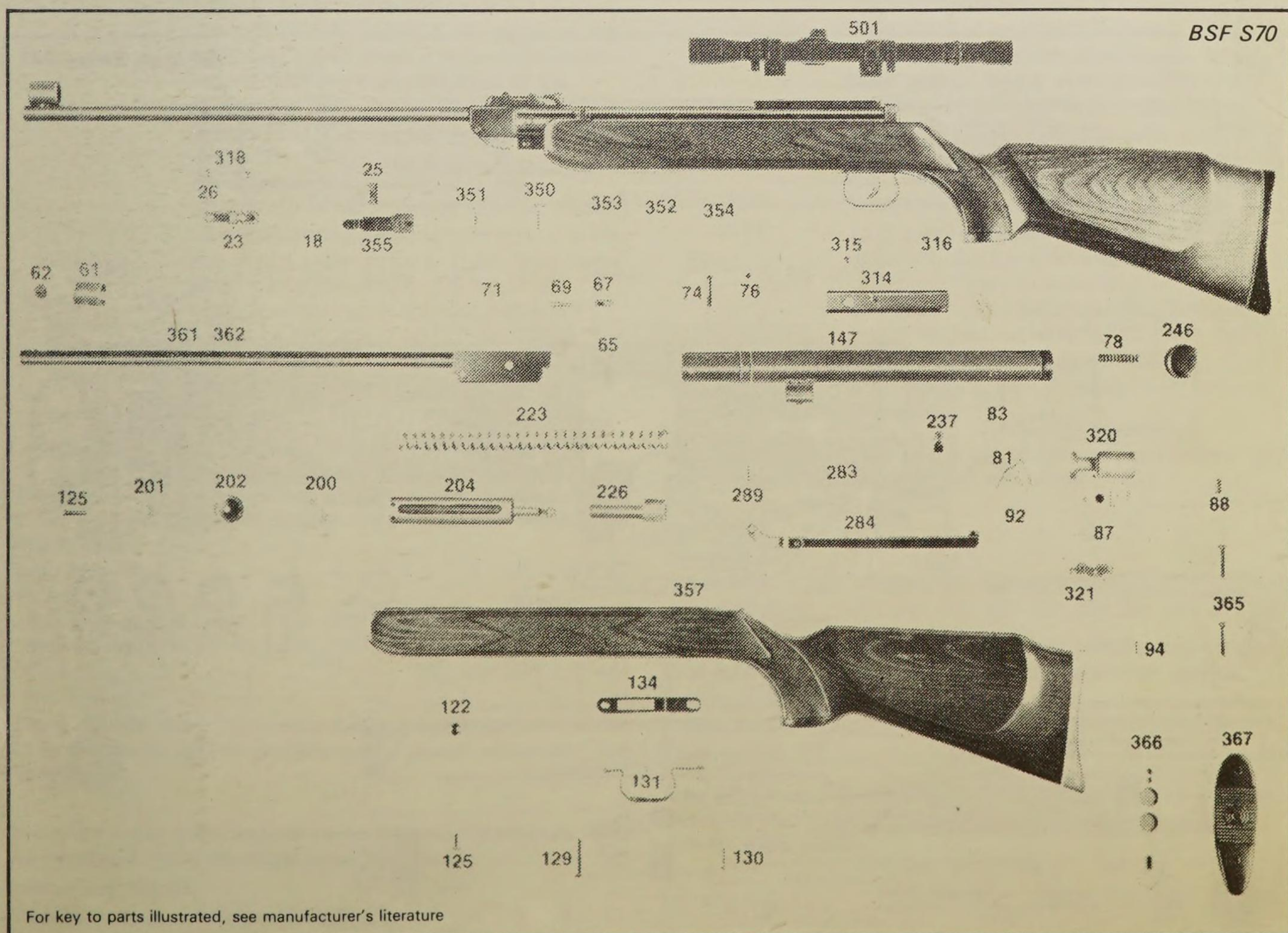
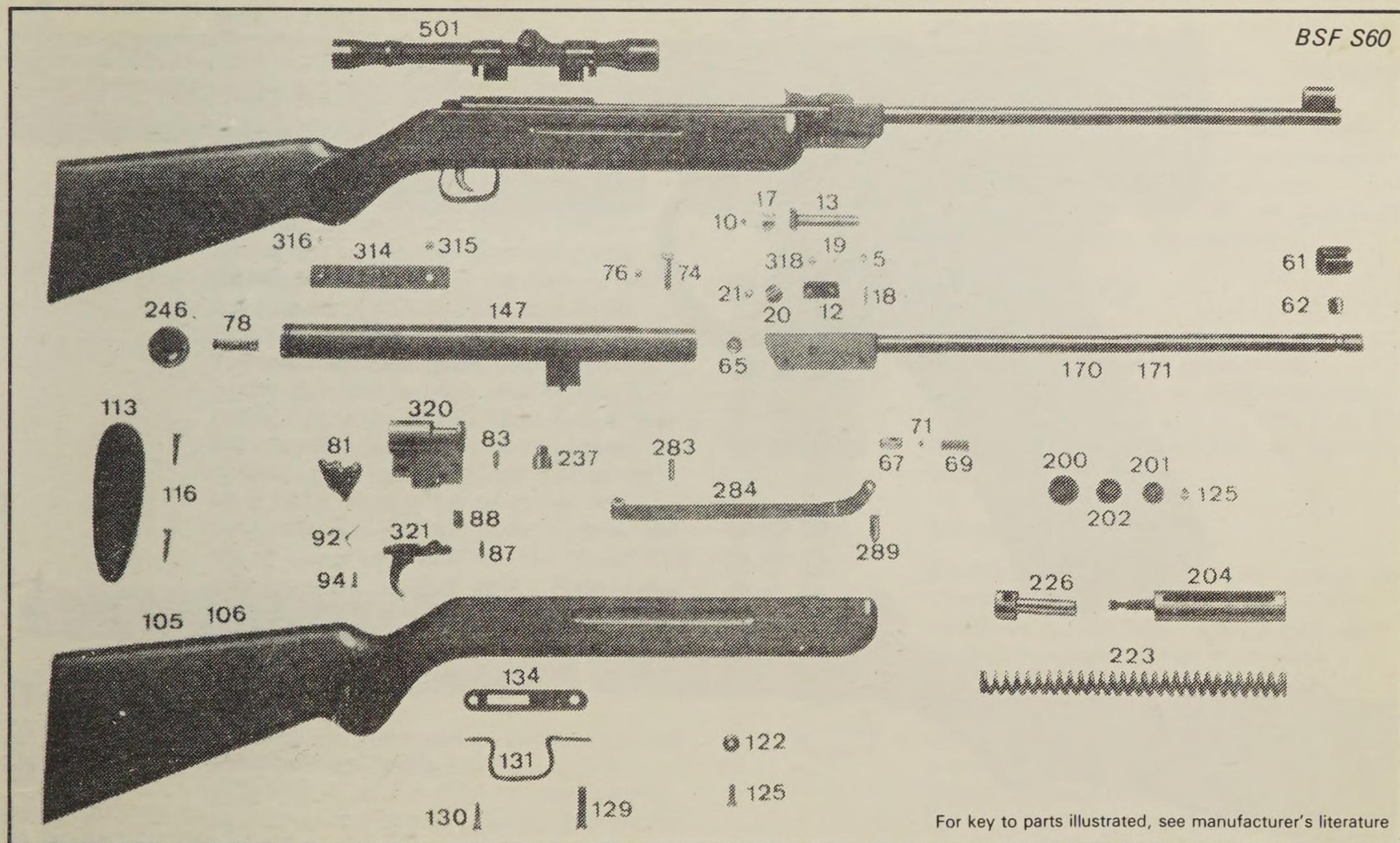
BSF S60

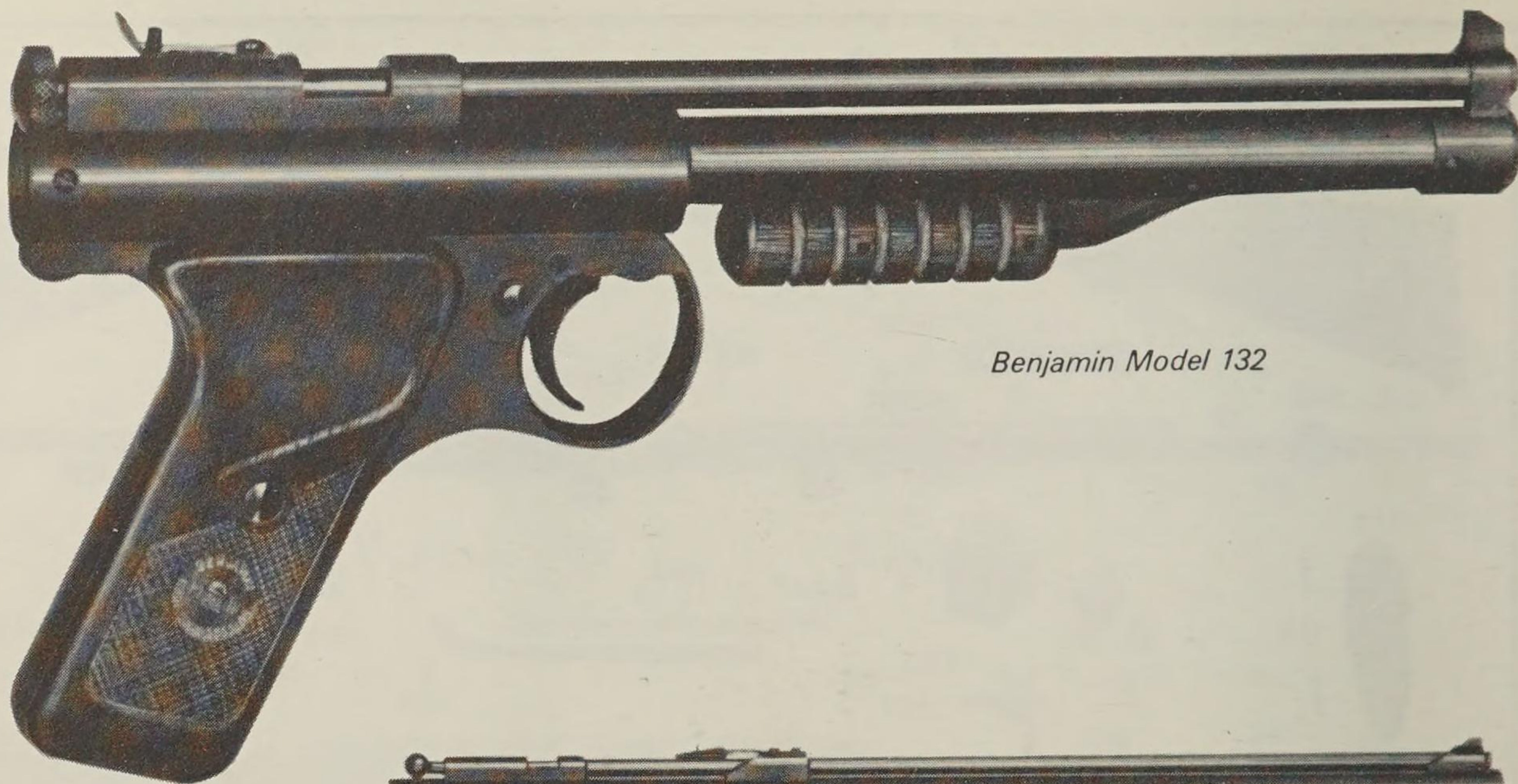
The longer-barrelled rifle from which the Bavaria 55 was derived, the S60 shares identical mechanical characteristics and construction, but has always featured the fully adjustable back sight. An extremely powerful design, it will occasionally exceed 800fs (245ms) or 600fs (185ms) with certain types of 4.5/0.177 and 5.5/0.22 pellet respectively. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,100/43.3; *bl*, 485/19.1; *rf*, N/A; *wt*, 3.00/6.62; *ps*, leather washer; *bs*, rubber or synthetic O-ring; *sft*, none.



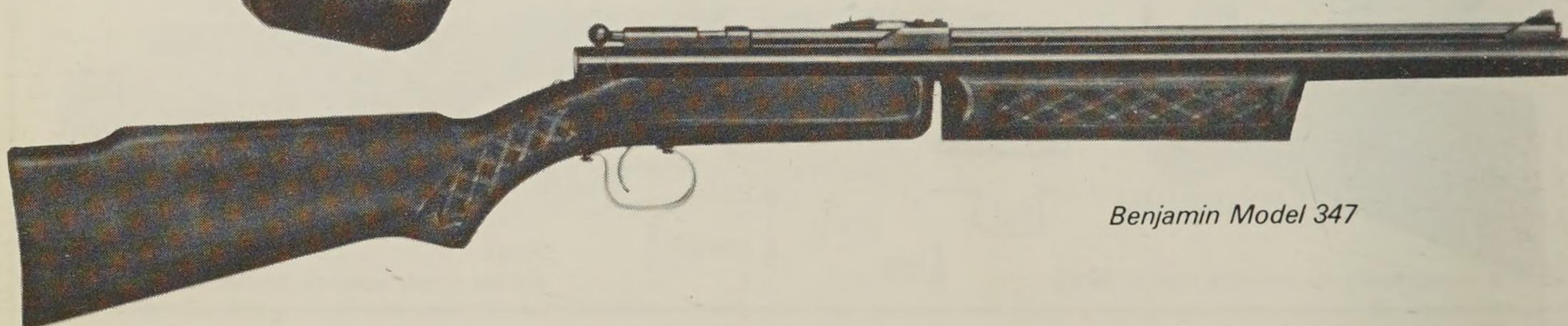
BSF S70

The largest and best of the BSF break-barrel rifles, this is simply an enlarged S60. Expensive in relation to some of its rivals, it nonetheless displays good finish and construction. Its supremely elegant walnut or beech stock – disfigured by a stamped-strip trigger guard and a poorly-shaped trigger lever – has a chequered pistol grip, a Monte Carlo comb, cheekpiece, white spacer and rubber butt-plate. Current guns have a grooved fore-end, though some earlier examples displayed chequering. The S70 is powerful and accurate, achieving similar performance to the S60. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2/R1; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,120/44.1; *bl*, 485/19.1; *rf*, N/A; *wt*, 3.22/7.10; *ps*, leather washer; *bs*, rubber or synthetic O-ring; *sft*, none.

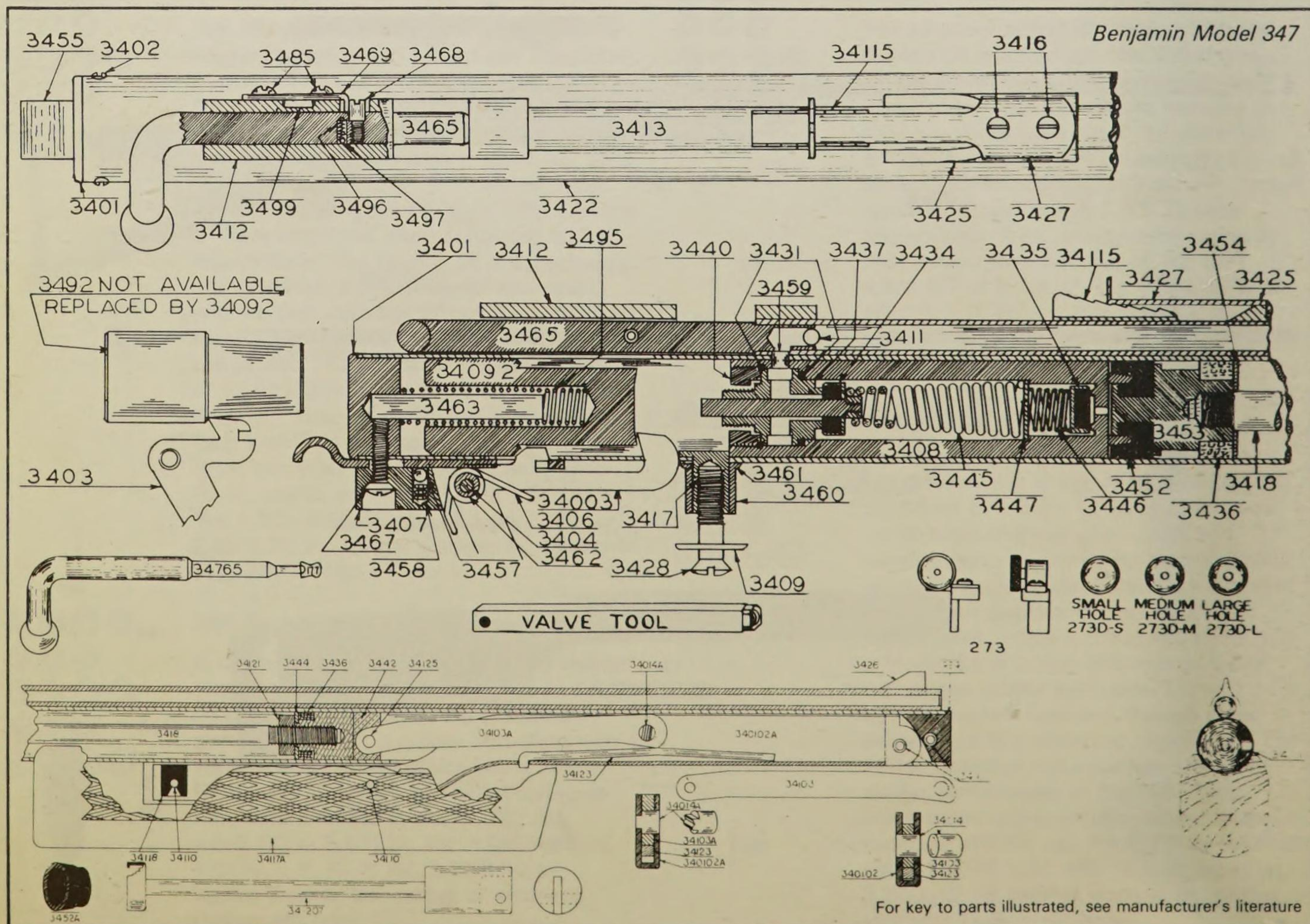




Benjamin Model 132



Benjamin Model 347



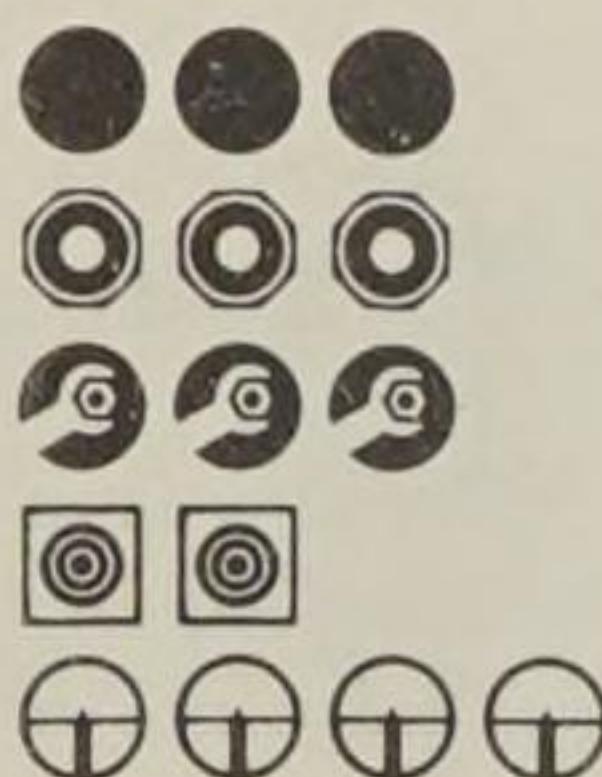
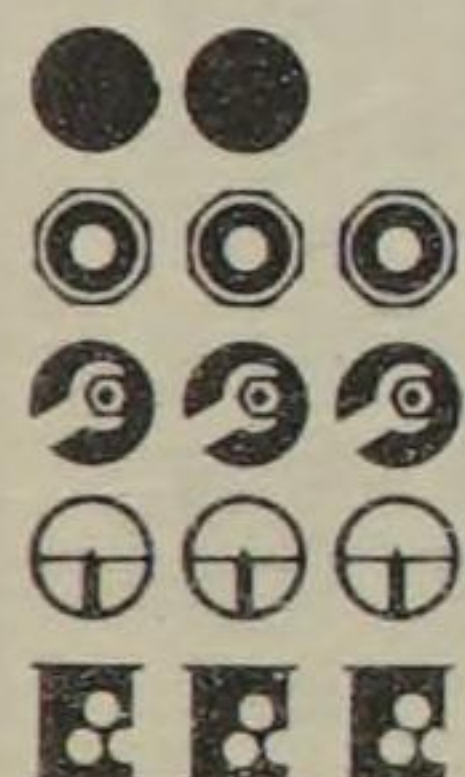
BENJAMIN

Benjamin Air Rifle Co., 8th and Marion Streets, St Louis, Missouri 63104, USA. UK distributor: Sussex Armoury; Standard warranty: 90 days*.

This business, which now owns Sheridan, was founded by Walter Rogers Benjamin, whose first satisfactory pneumatic was developed at the turn of the century with the assistance of Adolph Wissler & Co. of St Louis, a maker of surveying instruments. The two men subsequently entered partnership, but in 1927, after Wissler's death, control passed to Aloys Spack. It is still owned by the Spack family. Many different guns have been made since the early 1900s, though the range has now been refined to just two rifles, a pistol, and the Hi-Compression pellets. The Model 3030 gas-power BB repeater, with a 30-shot magnetic feed, has recently been discontinued.

Model 130

This typically American multi-stroke (3 – 12) pistol may be distinguished by its oval trigger aperture and a ribbed walnut pump handle beneath the air cylinder. The knurled bolt knob at the rear of the receiver is turned anticlockwise and retracted to open the loading port, cocking the trigger at the end of its travel, while a cross-bolt safety lies immediately behind the top of the trigger aperture. The sights are a fixed barleycorn and a coarsely adjustable open notch. The 130 is very similar to some Crosman designs but, though less attractively styled, displays sturdier, more traditional manufacturing methods. It is also marginally easier to load. *Type*, fixed-barrel multi-stroke pneumatic pistol with an underlever pump; *cl*, P4; *cal*, 4.5/0.177 (pellet or BB); *loa*, 279/11.0; *bl*, 203/8.0; *rf*, none; *wt*, 0.92/2.03; *ps*, Hy-Car washer; *sft*, manual.



Model 132

This is simply a more powerful, rifled pellet-firing derivative of the 130, capable of better accuracy. *Type*, fixed-barrel multi-stroke pneumatic pistol with an underlever pump; *cl*, P1/P2; *cal*, 5.5/0.22; *loa*, 279/11.0; *bl*, 203/8.0; *rf*, 6R; *wt*, 0.92/2.03; *ps*, Hy-Car washer; *sft*, manual.

Model 137

The 137 is a smaller calibre version of the 132. *Type*, fixed-barrel multi-stroke pneumatic pistol with an underlever pump; *cl*, P1/P2; *cal*, 4.5/0.177; *loa*, 279/11.0; *bl*, 203/8.0; *rf*, 6R; *wt*, 0.92/2.03; *ps*, Hy-Car washer; *sft*, manual.

Model 340

The Benjamin is comparable to some of the Crosmans, but displays sturdier, more traditional construction. It has a quite well finished American walnut stock, with a chequered pistol grip but lacking a butt-plate, and a chequered fore-end separated from the stock by an unsightly gap. There is a well-placed but rather imprecise sliding thumb-operated manual safety catch (on the tang behind the matt-finish grey-green receiver), while the bolt-action cocking/loading system is easier to operate than some of its rivals. However, pumping the Benjamin requires considerable force, even though two or even three shots are possible from each charging (see Table). The air valve becomes hot quite quickly, and must be allowed to cool after every five – ten shots at high velocity. The non-adjustable trigger is set at about 3.7lb (1.7kg). A stepped-slider back sight is standard, though alternatives may be obtained. *Type*, fixed-barrel multi-stroke pneumatic rifle with a swinging fore-end pump; *cl*, R4; *cal*, 4.45/0.175 (BB); *loa*, 882/34.7; *bl*, 484/19.1; *rf*, none; *wt*, 2.14/4.72; *ps*, Hy-Car washer; *sft*, manual.

Experiments with a Benjamin 347 pneumatic rifle

Gun: supplied by Sussex Armoury. Pellets: Eley Match, supplied by the manufacturer. The results were obtained from a Skan Chronoscope.

Pump-strokes	2	3	4	5	6	7	8	9	10
Velocity (fs)									
first shot	472	534	564	610	625	639	658	669	695
second shot	nm	275	328	363	466	537	586	628	641
third shot	—	—	—	—	258	289	366	415	481
fourth shot	—	—	—	—	—	—	—	nm ¹	nm ¹

¹Shots marked 'nm' (not measurable) emerged from the muzzle but too slowly to register properly on the Chronoscope (i.e., less than 250fs).

One shot from each sequence of four pump-strokes with the reservoir not exhausted between shots.

Pellets: Eley Match.

Shot	1	2	3	4	5	6	7	8	9	10
Velocity (fs)	552	596	647	641	647	639	646	647	652	643

Two shots from each sequence of four pump-strokes, with the reservoir exhausted between tests.

Pellets: Eley Match.

Test	1	2	3	4	5	6	7	8	9	10
Velocity (fs)										
first shot	534	528	552	556	569	552	544	556	539	560
second shot	321	331	319	328	338	329	321	330	311	337

One shot from each sequence of eight initial pump-strokes, four additional strokes before each successive stroke.

Pellets: RWS Hobby.

Shot ¹	1	2	3	4
Velocity (fs)	688	708	717	715

One shot from each sequence of eight initial pump-strokes, but with three rather than four additional strokes.

Pellets: RWS Hobby.

Shot ¹	1	2	3	4
Velocity (fs)	672	677	682	671

¹During both tests the valve heated up rapidly.



Model 342

This rifled version of the 340 fires diabolo pellets, increasing power and improving accuracy. *Type*, fixed-barrel multi-stroke pneumatic rifle with a swinging fore-end pump; *cl*, R3/R2; *cal*, 5.5/0.22; *loa*, 882/34.7; *bl*, 484/19.1; *rf*, 6R; *wt*, 2.14/4.72; *ps*, Hy-Car washer; *sft*, manual.



Model 347

A smaller-calibre version of the 342, which offers, perhaps, the best accuracy in the series. *Type*, fixed-barrel multi-stroke pneumatic rifle with a swinging fore-end pump; *cl*, R3/R2; *cal*, 4.5/0.177; *loa*, 882/34.7; *bl*, 484/19.1; *rf*, 6R; *wt*, 2.14/4.72; *ps*, Hy-Car washer; *sft*, manual.



Model 3100

This is identical with the 340 apart from the plainer stock, ribbed cylindrical fore-end/pump handle, over-barrel gravity-feed tube magazine and clever eccentric bar-elevated Bar-V back sight. *Type*, fixed-barrel multi-stroke pneumatic rifle with a swinging fore-end pump; *cl*, R4; *cal*, 4.45/0.175 (BB); *loa*, 882/34.7; *bl*, 484/19.1; *rf*, none; *wt*, 2.31/5.09; *ps*, Hy-Car washer; *sft*, manual; *mag*, 100-shot tube.



Model 3200

A variant of the 3100 which chambers larger-diameter balls. *Type*, fixed-barrel multi-stroke pneumatic rifle with a swinging fore-end pump; *cl*, R3; *cal*, 5.5/0.22 (ball); *loa*, 882/34.7; *bl*, 484/19.1; *rf*, none; *wt*, 2.14/4.72; *ps*, Hy-Car washer; *sft*, manual; *mag*, 85-shot tube.

BSA

BSA Guns Ltd., Armoury Road, Small Heath, Birmingham B11 2PX, England. US distributor: Precision Sports Inc.; Standard warranty: 12 months.

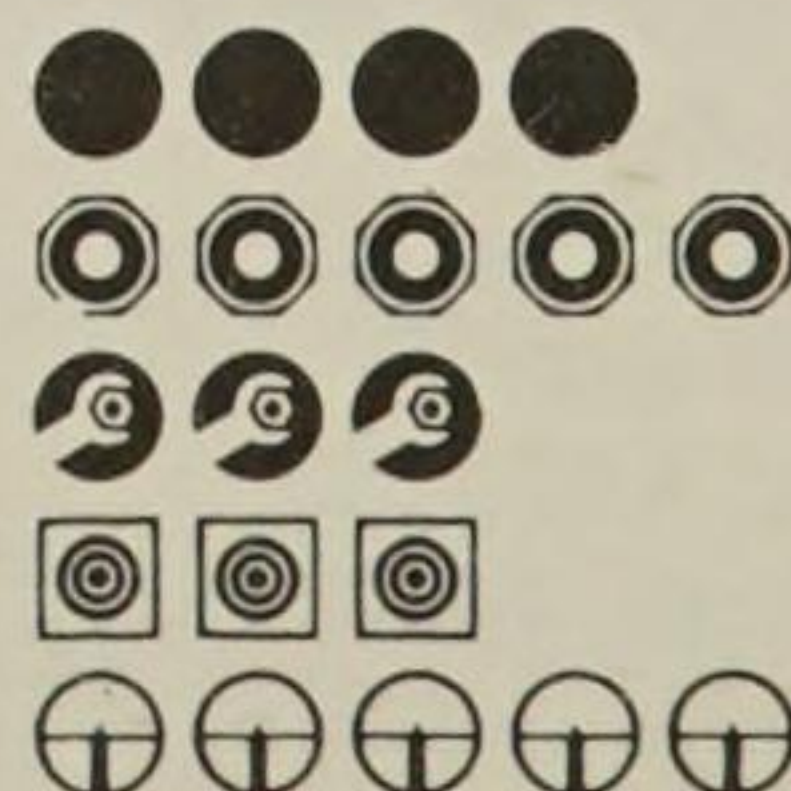
BSA was founded in 1861 and, after fulfilling lucrative contracts for the Snider and Martini-Henry rifles (1867–69, 1871 onward), entered voluntary liquidation in 1873. Its successor, the Birmingham Small Arms & Metal Co. Ltd, enjoyed little success until the late 1880s. Liquidated in 1897, the company re-emerged under its original name in 1901. BSA acquired rights to an underlever-cocking rifle designed in 1904 by Lincoln Jeffries, many thousands of which were made until late 1914. The company was split into three divisions in 1919, and BSA Guns Ltd made Jeffries underlever and other break-barrel rifles – perhaps as many as 200,000 – until 1939/40, when war stopped production and the facilities concentrated on firearms and munitions. Commercial operations were

successfully rebuilt in the immediate postwar period, when many airgun developments led to the Airsporter and Club (1948), the Cadet (1945) and Cadet Major (1947). The assets of the BSA Group that remained after a series of crises were acquired by Manganese Bronze Holdings Ltd in 1973. BSA Guns Ltd became a separate division operating within the parent organization, and trading continues.



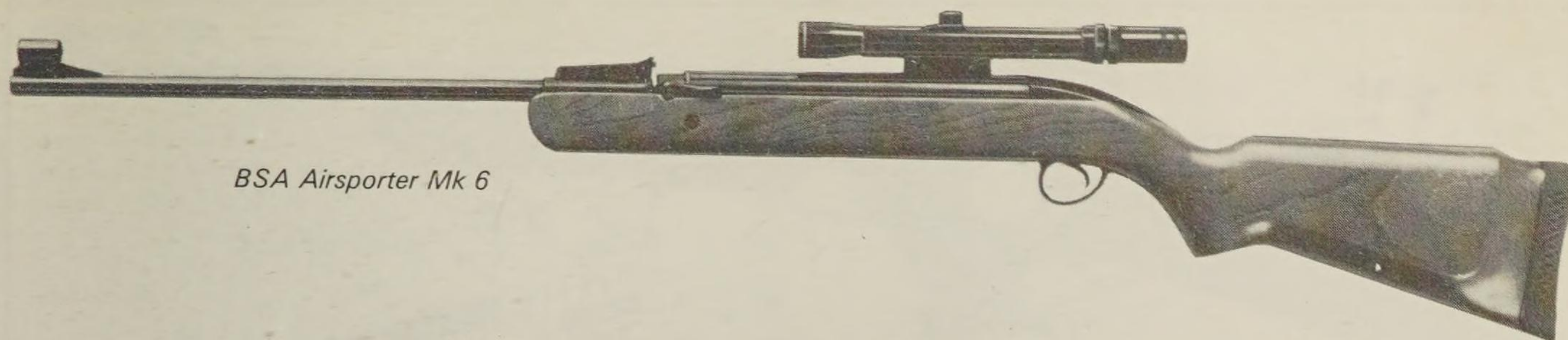
BSA Airsporter Mk 6

The original Airsporter appeared in 1948 and has since progressed through a number of variants, which is mute testimony to the excellence of its basic design. The Mk 6 shares the Power Seal piston and mainspring assembly, the sights and adjustable trigger system of the Mercury, but has a fixed barrel and is loaded through a manually-operated rotary plug in the breech. The 'short' underlever system allows the mechanism to be contained within a half-stock, while a locking catch lies on the head of the cocking lever. The melamine-finish beechwood stock has a pistol grip, a cheekpiece and a ventilated rubber butt-plate. The Airsporter is perhaps the best available underlever design, though there are now few representatives in its class. However, like the Mercury, it has no built-in provision for the arrestor block necessary to prevent movement of a telescope sight. *Type*, fixed-barrel underlever-cocking spring-air rifle; *cl*, R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,125/44.3; *bl*, 485/19.1; *rf*, 8R; *wt*, 3.58/7.89; *ps*, synthetic O-ring; *bs*, none; *sft*, none.

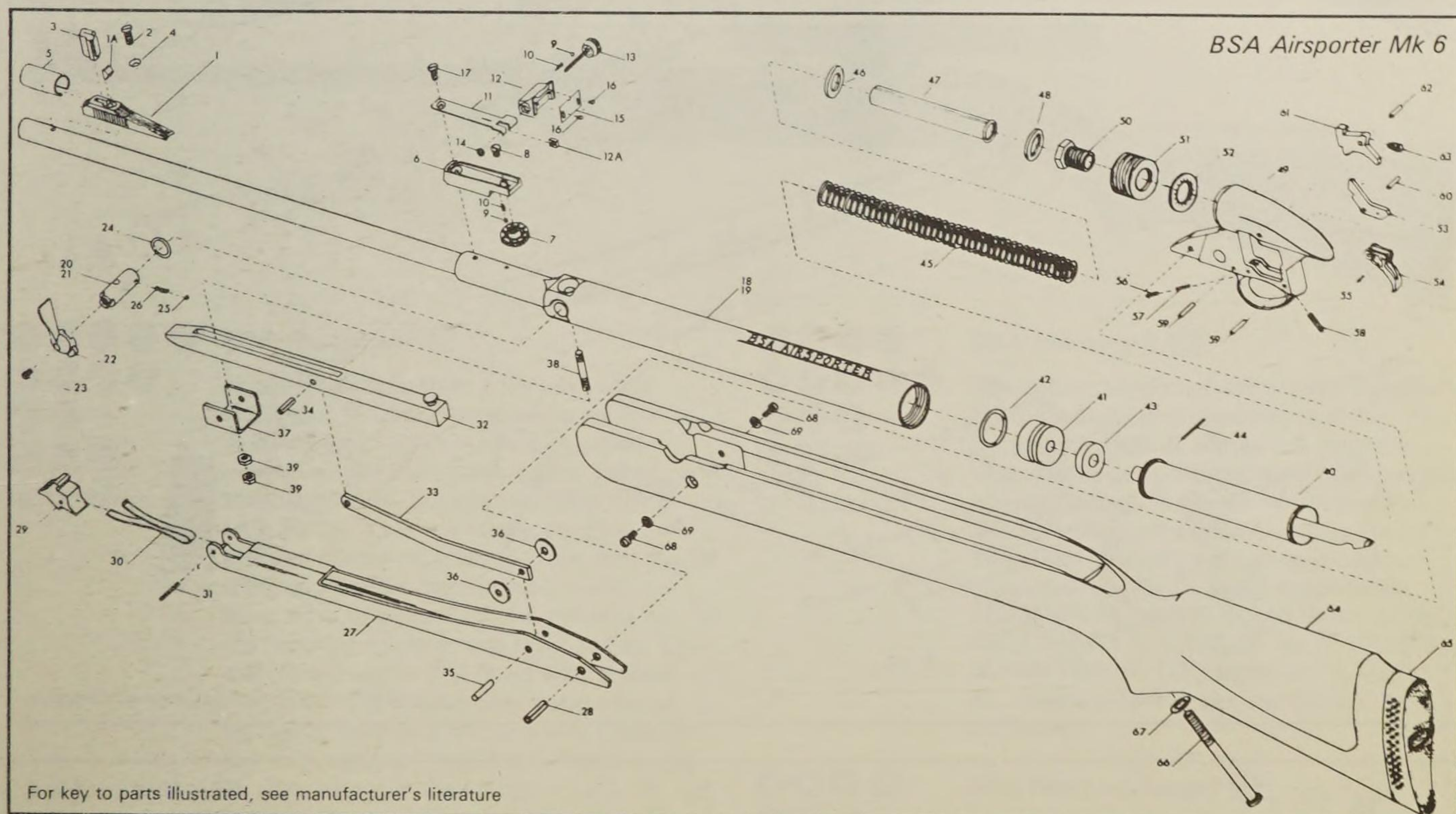


BSA Airsporter S

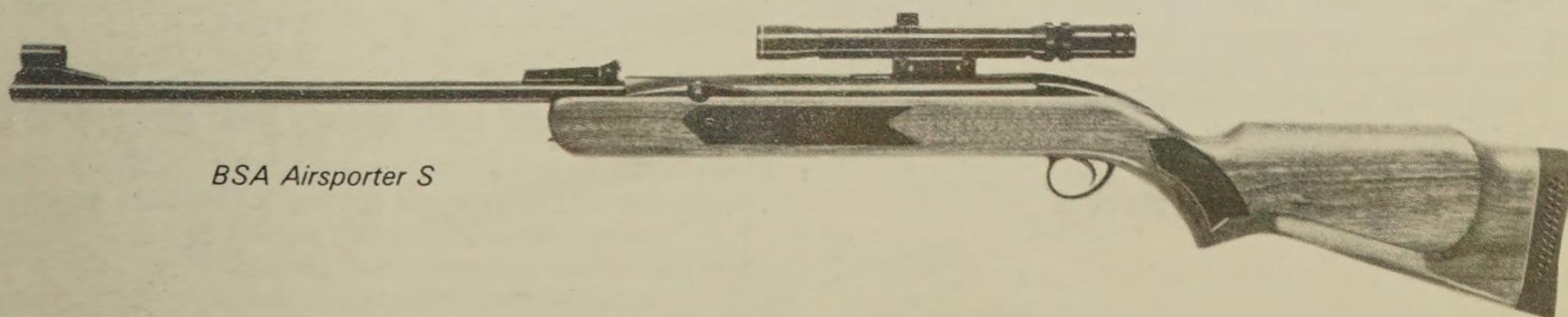
The deluxe version of the Airsporter Mk 6 made its début in 1979, displaying a specially selected oil-finished walnut stock with chequering pressed into the pistol grip and fore-end. Prominent fluting graces the front of the extruded cylinder/receiver unit, into which the heavier barrel is threaded. The sights are Mazak (a lead-zinc alloy) rather than Kemetal polymer. The attractive and well finished Airsporter S will develop in excess of 820fs (250ms) with some types of pellet. Although the gun is a relatively unambitious venture into the 'up-market' product range, it does represent good value. *Type*, fixed-barrel underlever-cocking spring-air rifle; *cl*, R1/R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,135/44.7; *bl*, 500/19.7; *rf*, 12R; *wt*, 3.61/7.96; *ps*, synthetic O-ring; *bs*, none; *sft*, none.



BSA Airsporter Mk 6



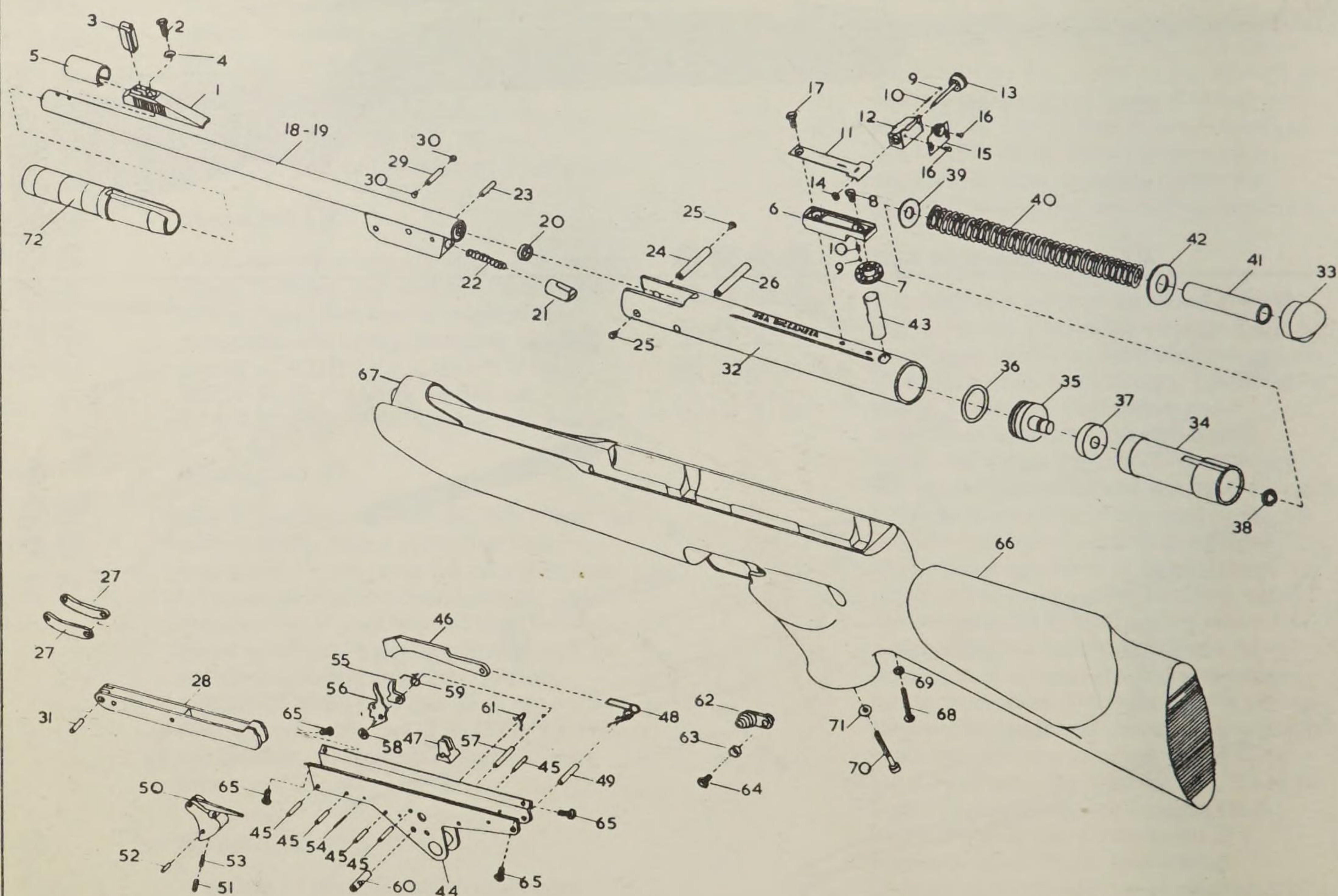
For key to parts illustrated, see manufacturer's literature



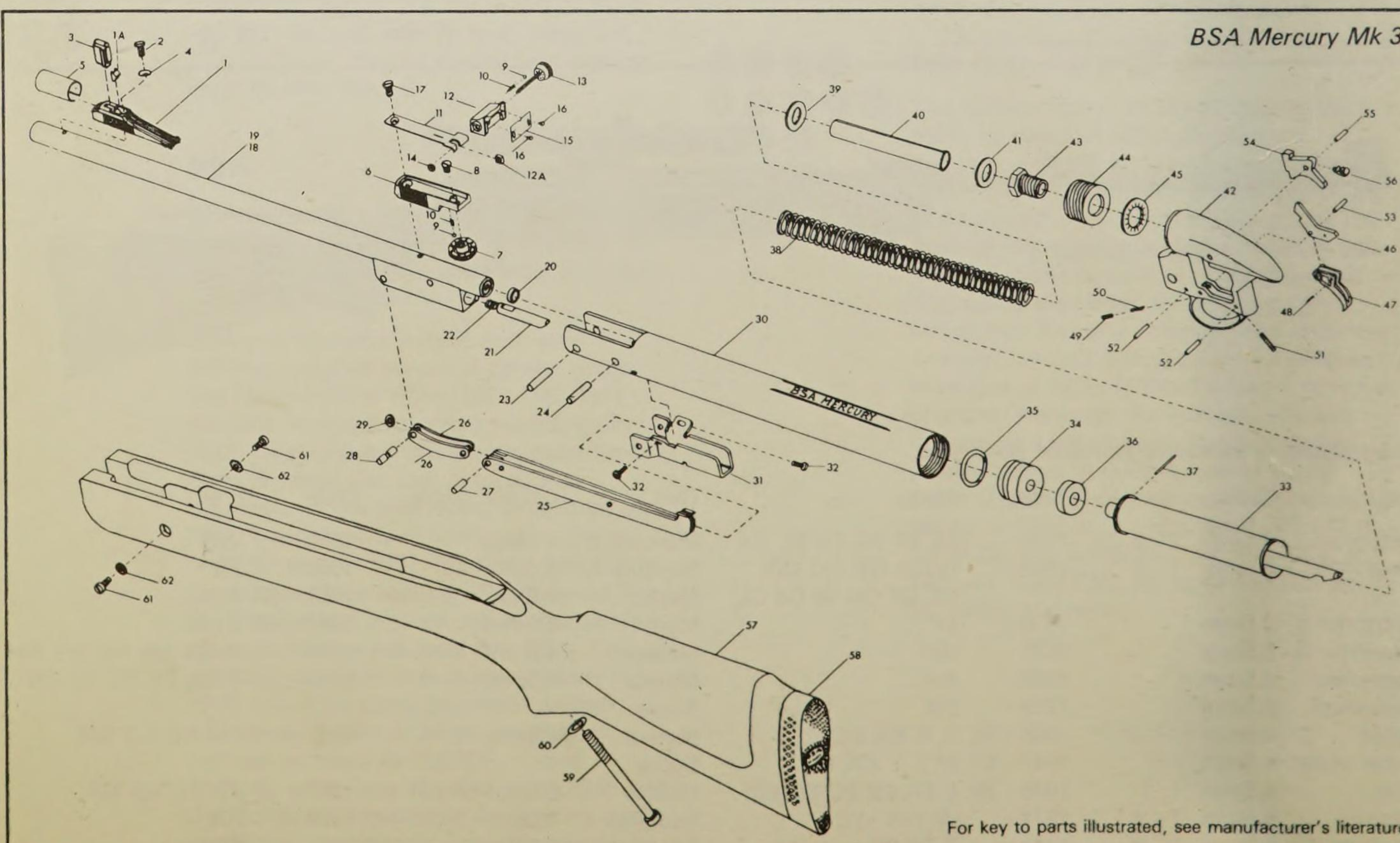
BSA Airsporter S

Progressions in serial number prefixes

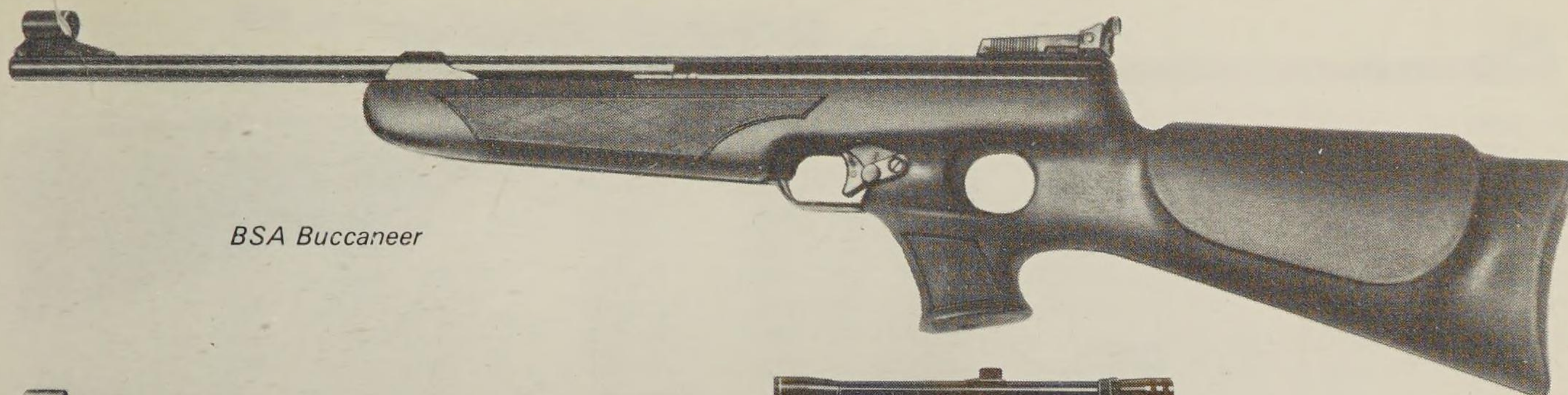
Gun	Calibre	Mark	Date	Prefix	Gun	Calibre	Mark	Date	Prefix
Airsporter	4.5mm	2-6	1959 -	EE EF EG EK EL EN	Mercury S	4.5mm		1980 -	WH
Airsporter	5.5mm	1-6	1948 -	G GA GB GC GD	Mercury S	5.5mm		1980 -	ZH
				GE GF GG GI GJ GL	Merlin	4.5mm		1962 - 68	K KA
Airsporter S	4.5mm		1979 -	EP	Merlin	5.5mm		1962 - 68	L LA
Airsporter S	5.5mm		1979 -	GM	Meteor	4.5mm	1-5	1959 -	N NA NB NE NG NH
Buccaneer	4.5mm		1978 -	AA	Meteor	5.5mm	1-5	1959 -	T TA TB TE TG TH
Buccaneer	5.5mm		1978 -	DA	Super				
Cadet	4.5mm		1945 - 59	A B BA BC	Meteor	4.5mm	3-5	1967 -	ND NE NG NH
Cadet Major	4.5mm		1947 - 57	M C Y CA CC	Super				
Club	4.5mm	1, 2	1948 - 59	E EA EB EC ED EE?	Meteor	5.5mm	3-5	1967 -	TD TE TG TH
Mercury	4.5mm	1-3	1971 -	W WB WC	Scorpion	4.5mm		1977 -	PA
Mercury	5.5mm	1-3	1971 -	Z ZB ZC	Scorpion	5.5mm		1977 -	PB



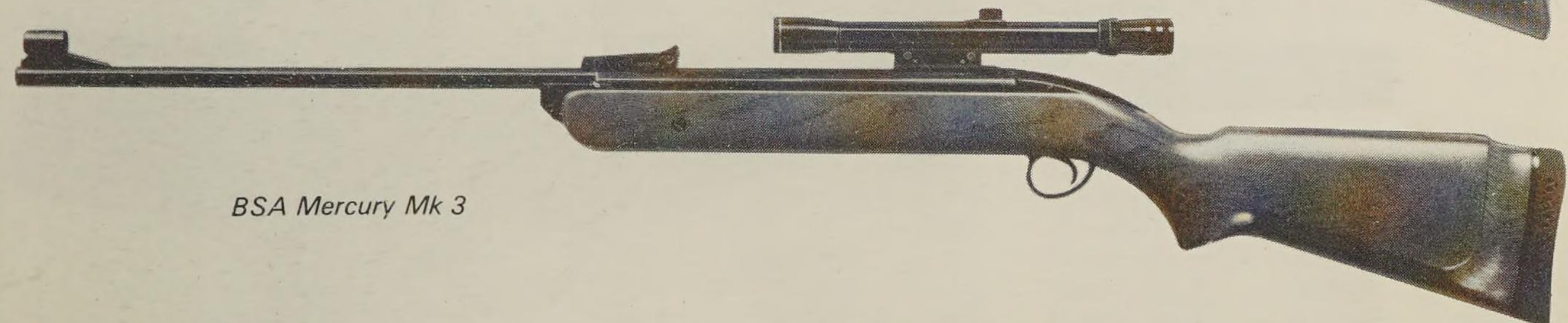
For key to parts illustrated, see manufacturer's literature



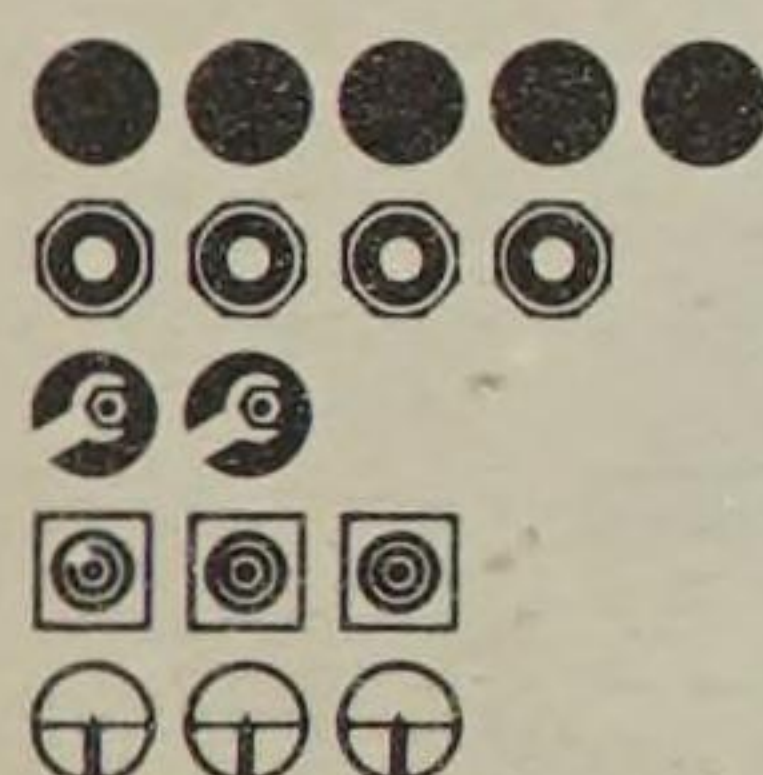
For key to parts illustrated, see manufacturer's literature



BSA Buccaneer

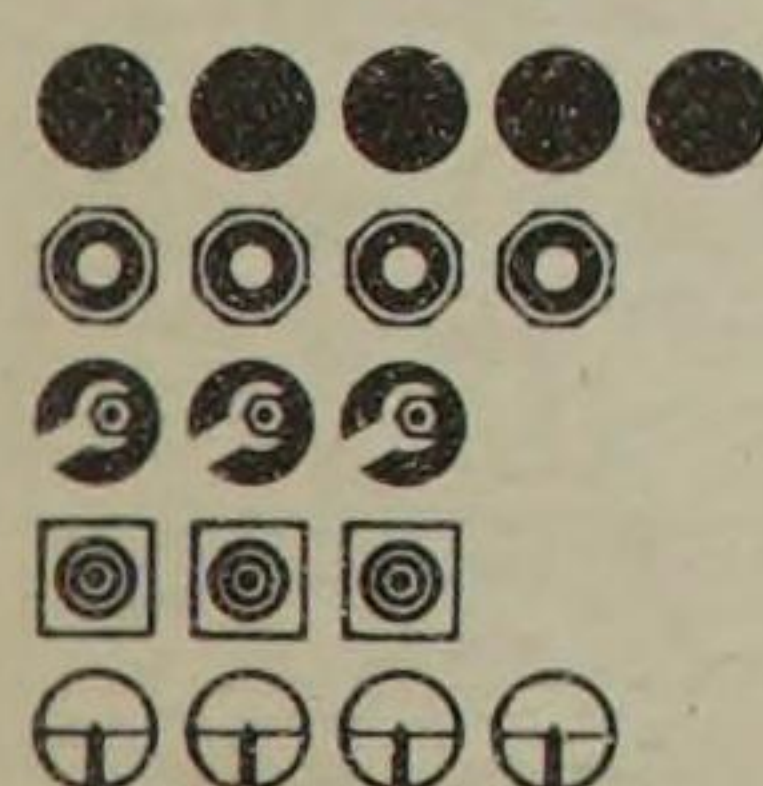


BSA Mercury Mk 3



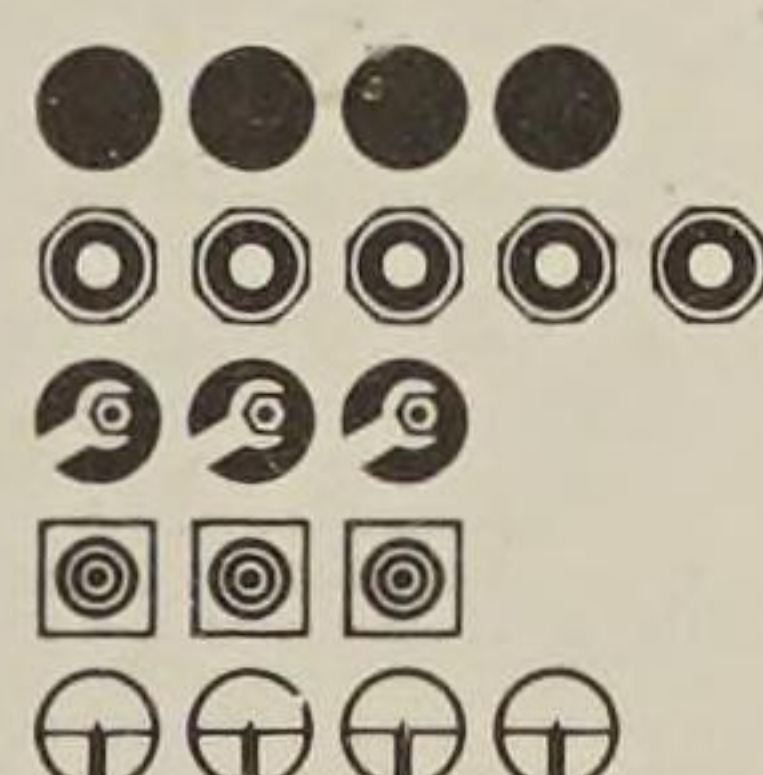
BSA Buccaneer

Really little more than a long-barrelled Scorpion, the Buccaneer made its first appearance in 1978; it has a modified version of the Scorpion's safety device, and standard sights, construction and Power Seal piston. The Buccaneer also has an unusual plastic thumbhole stock that avoids a pseudo-military appearance, while the back sight, mounted on the extreme rear of the receiver, gives a long sight radius. Like the Meteor sight, it is fitted with a small peep unit. The Buccaneer, low-powered and quite easy to cock, is a very advanced low-cost design. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3/R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 902/35.5; *bl*, 470/18.5; *rf*, 8R; *wt*, 2.71/5.98; *ps*, synthetic O-ring; *bs*, synthetic O-ring; *sft*, manual.



BSA Mercury Mk 3

The Mercury made its first appearance in 1971 and has since progressed through 3 'Marks'. The latest version features improved sights, cocking mechanism and trigger system. The guns share the barrel/barrel block and detent-lock with the Meteor. The new articulated link cocking-lever system has an intermediate laminated section between the link and the Power Seal piston, while the trigger components are anchored in a massive close-form forged alloy housing. The Mk 3 has the standard Kemetal sights and a melamine-finish beech stock with a massive retaining bolt that runs up through the pistol grip. Consistent performance and good accuracy, together with attention to mechanical design, make the gun good value. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,105/43.5; *bl*, 470/18.5; *rf*, 8R; *wt*, 3.23/7.12; *ps*, synthetic O-ring; *bs*, synthetic O-ring; *sft*, none.



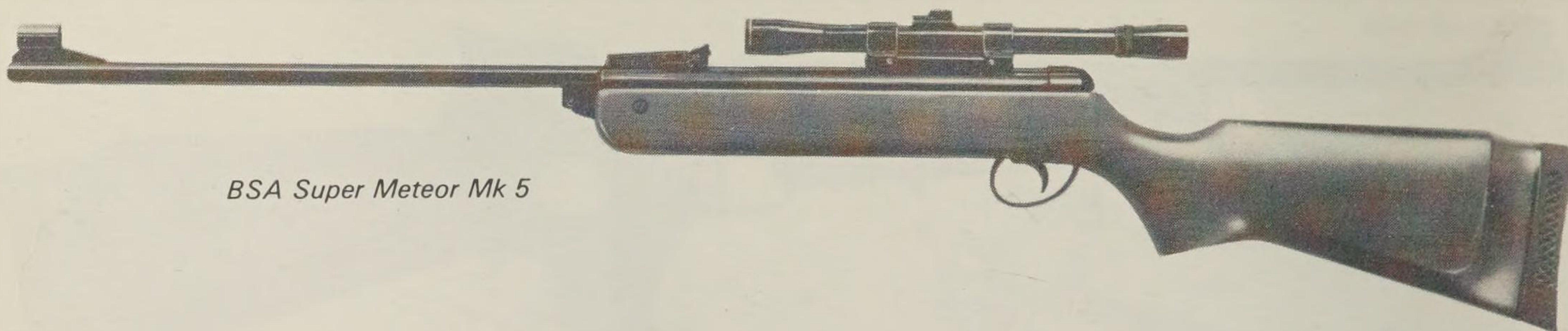
BSA Mercury S

The deluxe version of the standard Mercury Mk 3 made its first appearance in the summer of 1980. It shares the mechanical characteristics of the standard gun, but has all-metal sights, a heavier barrel and a specially finished, selected walnut stock. The pistol grip and the fore-end display pressed chequering. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,105/43.5; *bl*, 483/19.4; *rf*, 12R; *wt*, about 3.3/7.28; *ps*, synthetic O-ring; *bs*, synthetic O-ring; *sft*, none.

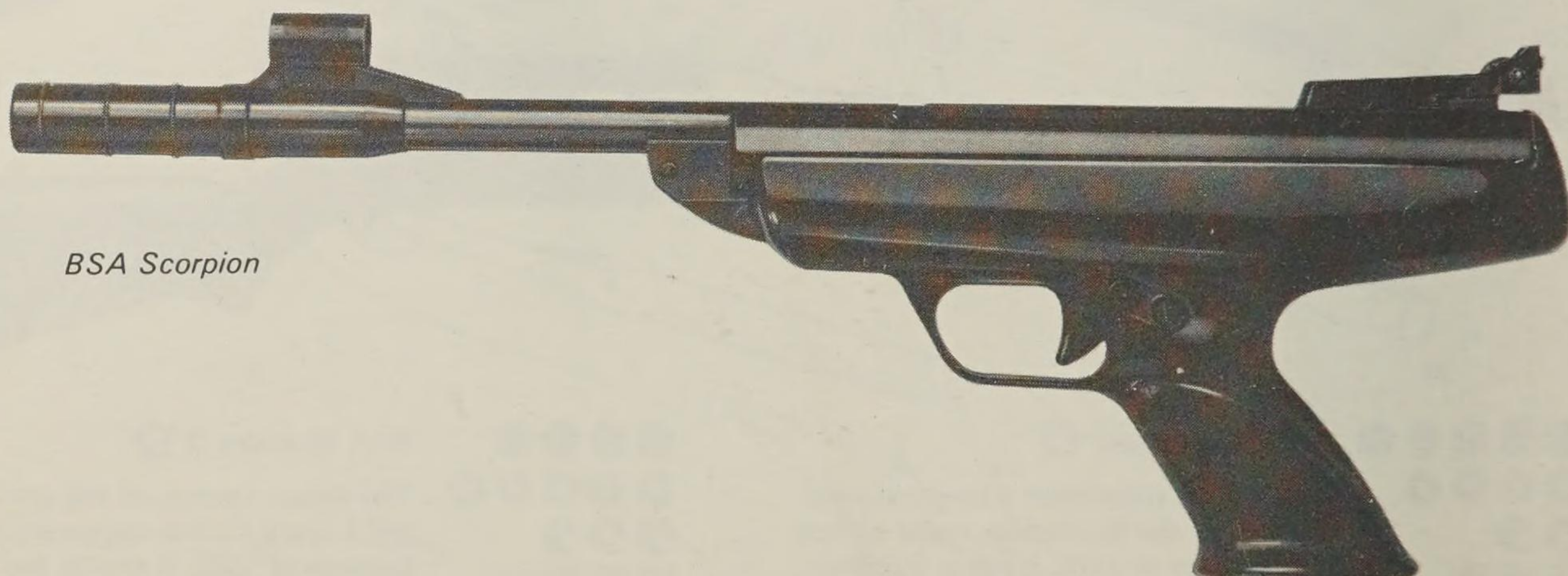


BSA Mercury Target

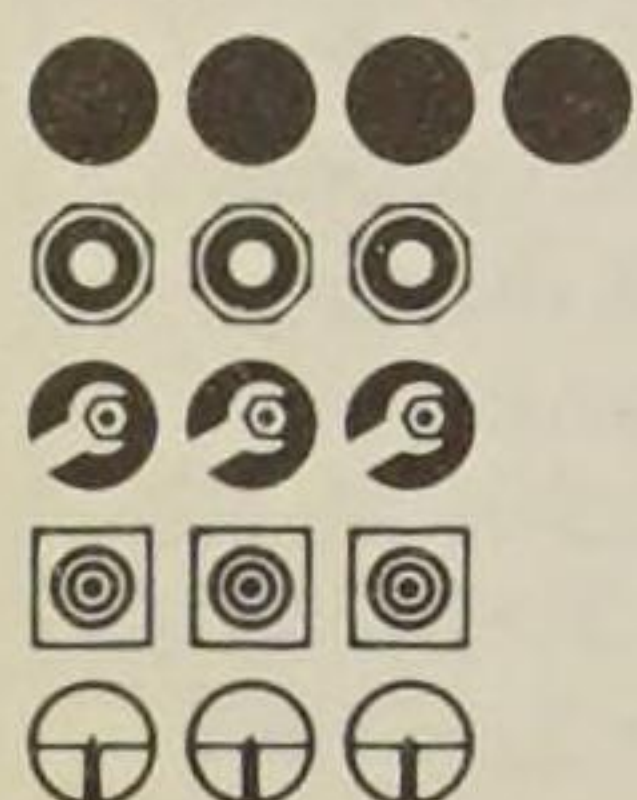
Made in small numbers in 1974–75, the Target had match class tunnel-pattern front and micro-adjustable aperture back sights. The unjustifiable expense of the sights caused production to be discontinued. Details for the Target are generally as those for the Mercury, although the Target is a little heavier.



BSA Super Meteor Mk 5

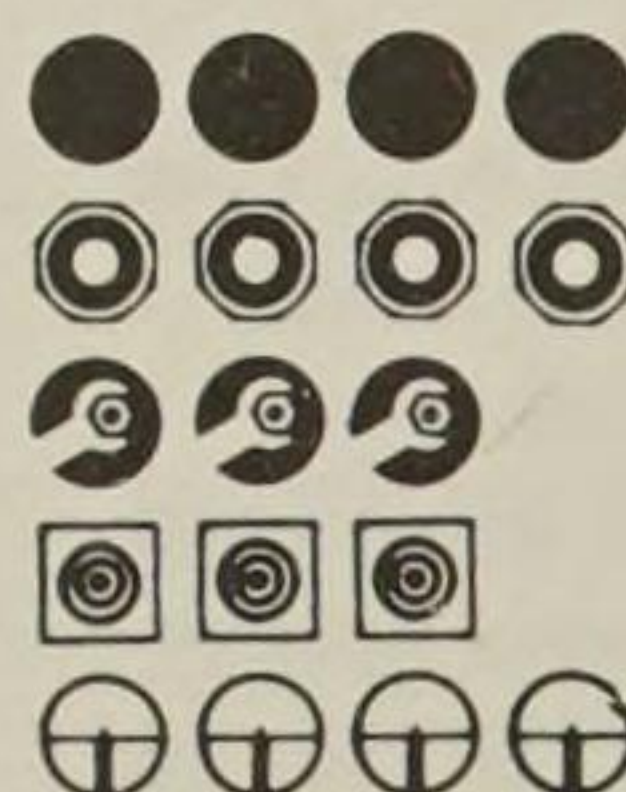


BSA Scorpion



BSA Meteor Mk 5

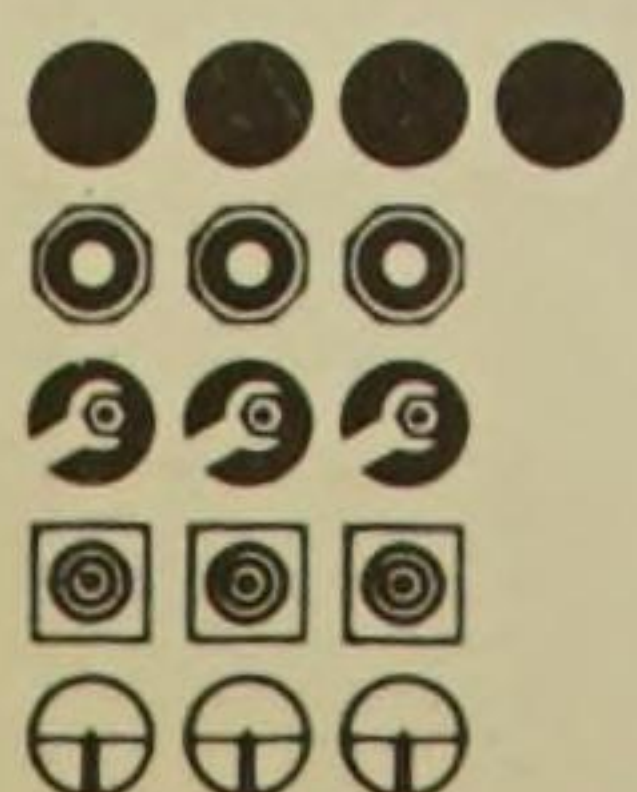
Introduced in 1977, this is the latest in a series that commenced in 1959. The Meteor has the same patented detent-locking system and non-enveloping barrel/barrel block construction as the Mercury, in which the detent bolt locks over a transverse pin. The Meteor features the floating head Power Seal piston. Its articulated cocking lever gives a smoother stroke than that of its predecessors, while lessening the risk of stock-splitting. The adjustable trigger mechanism is factory-set at 4–6lb (1.8–2.7kg). The Kemetal polymer sights comprise a hooded reversible blade-and-bead and an open micro-adjustable back sight; the back sight notch can be replaced with a small peep-type and the entire sight shifted back to abut the receiver cap. The melamine-finish beechwood stock lacks a butt-plate and cheekpiece, though the Meteor's good features make it a good buy for the novice or junior marksman. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,070/42.1; *bl*, 470/18.5; *rf*, 8R; *wt*, 2.67/5.89; *ps*, synthetic O-ring; *bs*, synthetic O-ring; *sft*, none.



bl, 470/18.5; *rf*, 8R; *wt*, 2.70/5.95; *ps*, synthetic O-ring; *bs*, synthetic O-ring; *sft*, none.

BSA Scorpion

The Scorpion is the only pistol to be commercially developed by BSA. Work began in 1972, though the design was not perfected until 1975/76 and full scale production was delayed until 1977. Virtually a short rifle, developing as much as 550fs (170ms) with some types of pellet, it is the most powerful spring-air pistol available in Britain. The barrel/barrel block construction, detent system, sights and Power Seal piston are shared with the Meteor, but one original feature is a new hammer-type trigger unit which was patented by Roger Wackrow, Robert Cranston and Harold Jones (GB 1,423,153, sought in 1972). The adjustable trigger (factory set at 3–5lb) incorporates a safety device applied automatically as the breech opens. The catch on the left side of the grip behind the trigger must be manually reset before each shot. The Scorpion is large, heavy, displays appreciable recoil/spring-surge reaction, and requires considerable strength to cock it, even if the removable plastic barrel extension is used. The pistol presents a few dismantling difficulties, but they are largely offset by the technical benefits of the trigger system. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P1/P2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 400/15.7; *bl*, 198/7.8; *rf*, 8R; *wt*, 1.58/3.48; *ps*, synthetic O-ring; *bs*, synthetic O-ring; *sft*, semi-automatic.

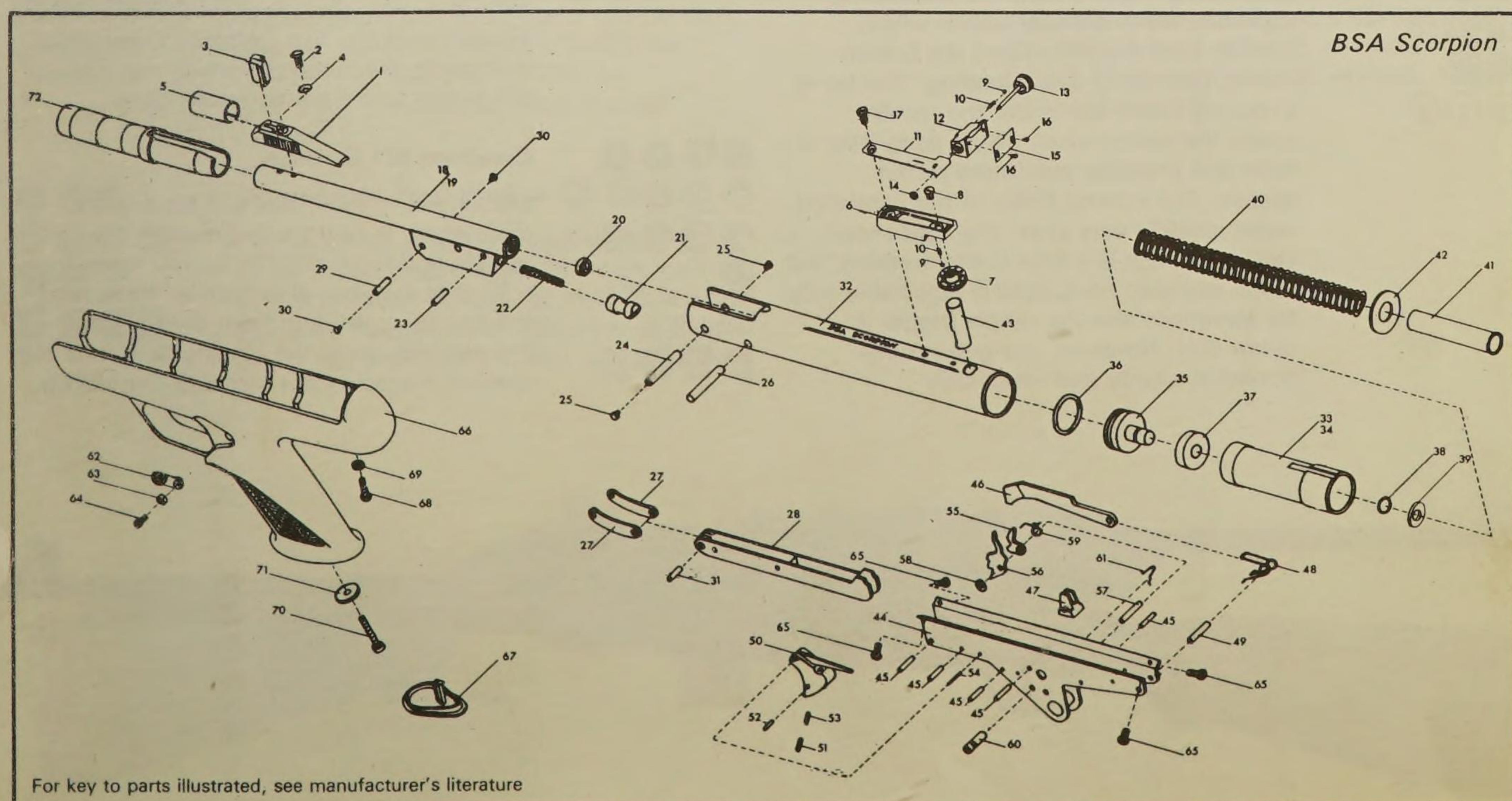


BSA Super Meteor Mk 5

This minor variant of the standard Meteor displays a better stock with a cheekpiece, a slight Monte Carlo comb, a ventilated rubber butt-plate and a deeper fore-end, all of which enhance its appearance and improve its handling. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,075/42.3;

BSA serial number prefixes, 1945-80

Prefix	Gun	Calibre	Date	Prefix	Gun	Calibre	Date
A	Cadet	4.5mm	1945-46	KA	Merlin	4.5mm	1964-68
AA	Buccaneer	4.5mm	1979-	L	Merlin	5.5mm	1962-64
B	Cadet	4.5mm		LA	Merlin	5.5mm	1964-68
BA	Cadet	4.5mm	1949-51	M	Cadet Major	4.5mm	1947-48
BC	Cadet	4.5mm	1951-59	N	Meteor Mk 1	4.5mm	1959-62
C	Cadet Major	4.5mm	1947-49	NA	Meteor Mk 2	4.5mm	1962-66
CA	Cadet Major	4.5mm	1949-55	NB	Meteor Mk 2	4.5mm	1966-68
CC	Cadet Major	4.5mm	1955-57	ND	Meteor Super Mk 3	4.5mm	1967-69
DA	Buccaneer	5.5mm	1979-	NE	Meteor Mk 3 and Super Meteor Mk 3	4.5mm	1969-73
E	Club Mk 1	4.5mm	1948-50	NG	Meteor Mk 4 and Super Meteor Mk 4	4.5mm	1973-8?
EA	Club Mk 1	4.5mm	1950-54	NH	Meteor Mk 5 and Super Meteor Mk 5	4.5mm	1979-
EB	Club Mk 1	4.5mm	1955-57	PA	Scorpion	4.5mm	1977-
EC	Club Mk 1	4.5mm	1958	PB	Scorpion	5.5mm	1977-
ED	Club Mk 2	4.5mm	1959	T	Meteor Mk 1	5.5mm	1959-62
EE	Airsporter Mk 2 and a few Club Mk 2	4.5mm	1959-65	TA	Meteor Mk 2	5.5mm	1962-66
EF	Airsporter Mk 2	4.5mm	1965-67	TB	Meteor Mk 2	5.5mm	1966-68
EG	Airsporter Mk 2	4.5mm	1967-68	TD	Meteor Super Mk 3	5.5mm	1967-69
EK	Airsporter Mk 4	4.5mm	1969-71	TE	Meteor Super Mk 3 and Meteor Mk 3	5.5mm	1969-73
EL	Airsporter Mk 5	4.5mm	1971-74	TG	Meteor Mk 4 and Super Meteor Mk 4	5.5mm	1974-78
EN	Airsporter Mks 5 and 6	4.5mm	1974-	TH	Meteor Mk 5 and Super Meteor Mk 5	5.5mm	1979-
EP	Airsporter S	4.5mm	1979-	W	Cadet	4.5mm	1949-50
G	Airsporter Mk 1	5.5mm	1948-54	W	Mercury Mk 1	4.5mm	1971-73
GA	Airsporter Mk 1	5.5mm	1955-56	WB	Mercury Mk 2	4.5mm	1974-78
GB	Airsporter Mk 1	5.5mm	1956-68	WC	Mercury Mk 3	4.5mm	1978-
GC	Airsporter Mk 1	5.5mm	1958-59	WH	Mercury S	4.5mm	1980-
GD	Airsporter Mk 2	5.5mm	1959-65	Y	Cadet Major	4.5mm	1949
GE	Airsporter Mk 2	5.5mm	1965-67	Z	Mercury Mk 1	5.5mm	1971-73
GF	Airsporter Mk 2	5.5mm	1967-68	ZB	Mercury Mk 2	5.5mm	1974-78
GG	Airsporter Mk 2	5.5mm	1968-69	ZC	Mercury Mk 3	5.5mm	1978-
GI	Airsporter Mk 4	5.5mm	1969-71	ZH	Mercury S	5.5mm	1980-
GJ	Airsporter Mk 5	5.5mm	1971-74				
GL	Airsporter Mks 5 and 6	5.5mm	1974-				
GM	Airsporter S	5.5mm	1979-				
K	Merlin	4.5mm	1962-64				



For key to parts illustrated, see manufacturer's literature

CHINESE STATE

Chinese State Factories, Peking, Shanghai and Tientsin, People's Republic of China. UK distributors: Sussex Armoury (Lion), David Nickerson (Arrow and I-Type), Relum Ltd (I-Type); US distributors: none; Standard warranty: none.

These guns present a confusing series of brand-names that are subject to continual change as the Ministry of Light Industrial Products is apt to terminate production without consulting the distributors. Many of the guns seen in Britain were imported by the Abbey Supply Co., who supply many of the distributors. Known brands include the Deer (made in Tientsin, later Peking), Hunter (Shanghai), Pioneer (Shanghai?) and Super Hunter (Shanghai), all of which are conventional barrel-cockers comparable to the Arrow.

Arrow

This rifle, made in Peking, is a solid if poorly finished barrel-cocker, comparatively inexpensive and unsophisticated. It has a simple non-adjustable trigger with a rather stiff pull, a hooded blade front sight and a vertically-adjustable tangent-leaf back sight. Sling swivels lie on the sides of the varnished hardwood stock and a grasping groove appears in the fore-end. *Type*, break-barrel spring-air rifle, detent-locked (bolt?); *cl*, R3; *cal*, 4.5/0.177; *loa*, approximately 1,090/42.9; *bl*, approximately 470/18.5; *rf*, 12R; *wt*, N/A; *ps*, leather washer; *bs*, leather washer; *sft*, none.

Lion (B-45-3)

The Peking-made Lion has a fascinating, sophisticated underlever action which retracts both the piston and the breech-sleeve, permitting direct-loading. The tip of a rocking safety bar under the receiver enters the piston when the cocking lever is open and prevents premature piston release. The internal finish of the varnished wood stock is very poor; the light sheet-steel butt-plate is a little uncomfortable; the crude stamped back sight is adjustable only for elevation; and the simple trigger is rather stiff. However, the gun is quite powerful, sturdy and reasonably

competitively priced, but marred by its finish. *Type*, fixed-barrel underlever-cocking spring-air rifle; *cl*, R2/R3; *cal*, 4.5/0.177; *loa*, 1,045/41.1; *bl*, 450/17.7; *rf*, 12R; *wt*, 3.36/7.41; *ps*, leather washer; *sft*, automatic.

I-Type (Model 6235)

The Shanghai-made Industry Brand pistol is a typical Chinese product: sturdy, but unimaginatively designed and displaying inferior finish. It features a moulded chequered grip, a vertically adjustable spring-leaf back sight and a simple non-adjustable trigger which, on some specimens, gives a very stiff pull indeed. *Type*, break-barrel spring-air pistol, detent-locked (ball?); *cl*, P4; *cal*, 4.5/0.177; *loa*, 327/12.9; *bl*, 130/5.1; *rf*, 12R; *wt*, 1.3/2.87; *ps*, leather washer; *bs*, leather ring; *sft*, none.

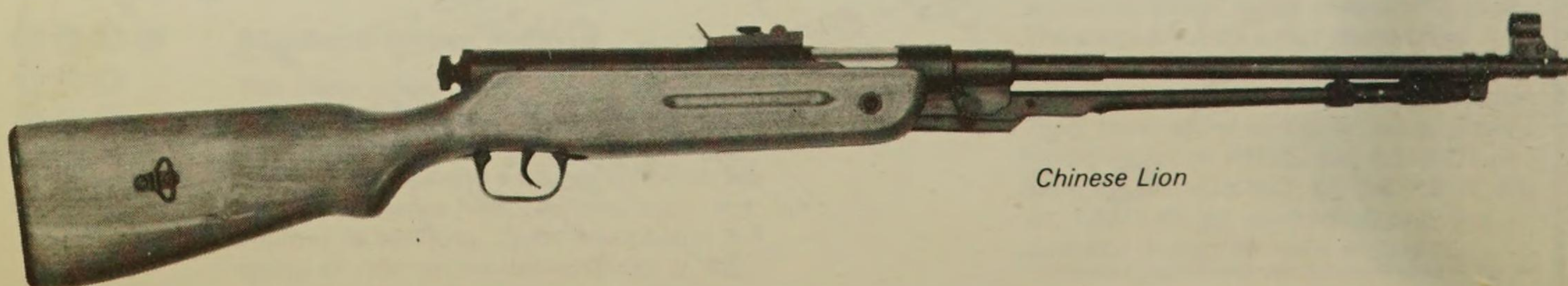
CROSMAN

Crosman Arms Co., 980 Turk Hill Road, Fairport, New York 14450, USA. UK distributor: Sussex Armoury; Standard warranty: 90 days*.

Crosman began life in the early 1920s when William A. McLean, chauffeur to the owner of the Crosman Seed Co., patented a pneumatic rifle (US 1,512,993 of 1924). The gun company was founded to develop and market McLean's and a number of other designs. However, its fortunes declined in the 1930s and it was acquired in 1940 by Phillip Y. Hahn, who had left Crosman in 1930. A wide variety of gas and pneumatic guns has been made since 1945, though it is on the latter that much of Crosman's reputation rests. The Coleman Corporation now owns the business, which nonetheless still trades under the Crosman name.

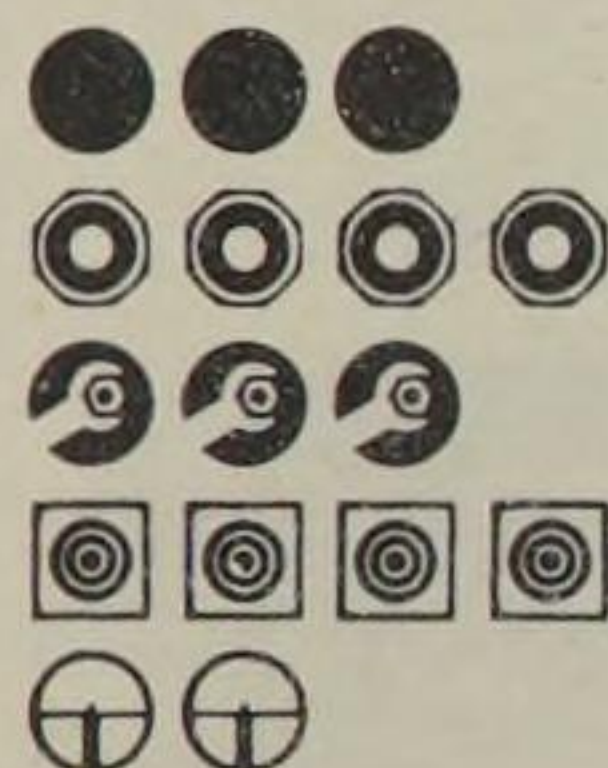
Crosman M1 Carbine

Introduced in 1967, this self-loading BB gun, which is cocked by grasping the muzzle and retracting the barrel, feeds from a 22-shot over-barrel magazine. Retracting the handle protruding from the right side of the receiver opens the loading port, and the dummy magazine is a reservoir containing



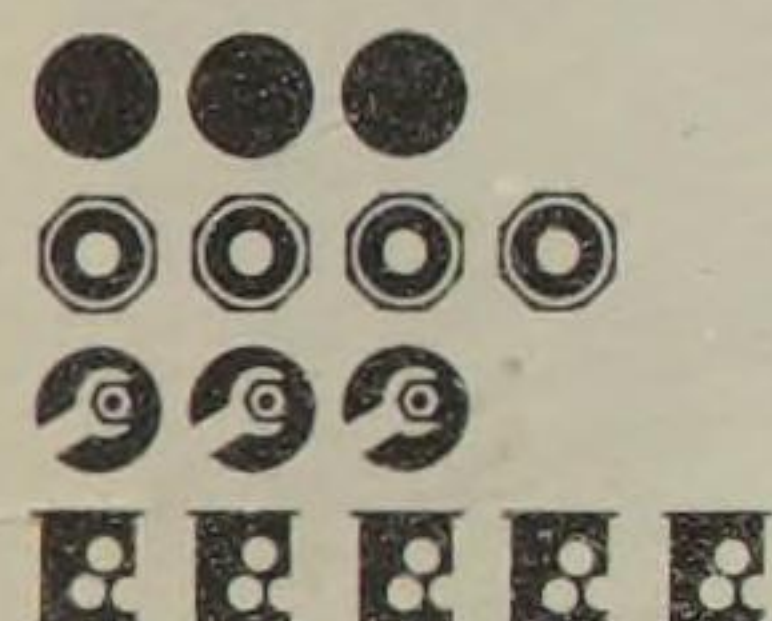
Chinese Lion

about 270 BBs. The M1 has a synthetic Croswood stock and handguard, a surprisingly good trigger-pull and a clever fully adjustable peep sight. The result is a popular 'fun gun' that is quite accurate at short range despite its smoothbore barrel. *Type*, push-in barrel spring-air gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 898/35.4; *bl*, 403/15.9; *rf*, none; *wt*, 2.28/5.03; *s*, synthetic; *sft*, none.



Crosman Mks I and II FAC F

These sturdy adjustable-power guns, identical but for calibre, follow the lines of the Ruger target pistol. They have sliding safeties on the front left side of the frame and are cocked and loaded by a knob at the rear of the receiver. The gas cylinder lies in the grip. *Type*, fixed-barrel gas-powered pistol; *cl*, C2:P3; *cal*, 4.5/0.177 (Mk I), 5.5/0.22 (Mk II); *loa*, 282/11.1; *bl*, about 190/7.5; *rf*, 10R; *wt*, 1.22/2.69; *s*, synthetic; *sft*, manual.



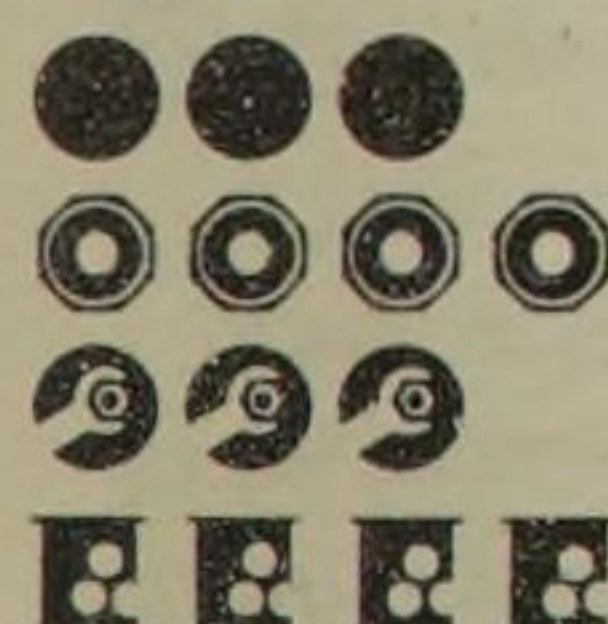
Crosman 38-C(ombat) FAC F

An interesting well made gas-powered revolver – with a cylinder that revolves during firing – the double-action 38-C is modelled on contemporary Smith & Wesson practice. Power is derived from the gas cartridge housed in the grip. *Type*, fixed-barrel gas-powered revolver; *cl*, P4; *cal*, 4.5/0.177; *loa*, 241/9.5; *bl*, 82/3.2; *rf*, 10R; *wt*, 0.87/1.92; *s*, synthetic; *mag*, 6-shot cylinder.



Crosman 38-T(target) FAC F

A heavier derivative of the 38-C, featuring a longer barrel and better sights, the 38-T is accurate, competitively priced and a useful training aid. *Type*, fixed-barrel gas-powered revolver; *cl*, C2:P3; *cal*, 4.5/0.177; *loa*, 298/11.7; *bl*, 150/5.9; *rf*, 10R; *wt*, 1.19/2.62; *s*, synthetic; *mag*, 6-shot cylinder.



Crosman 44 Peacemaker FAC F

Formerly known as the Frontier 44, this single-action design is modelled on the Colt M1873 revolver. Introduced in 1970, it was preceded by the similar 1958-vintage Single Six. It has a zinc-alloy frame, a steel barrel

and a gas cartridge housing where the ejector rod would usually be found. *Type*, fixed-barrel gas-powered revolver; *cl*, P4; *cal*, 4.5/0.177; *loa*, 262/10.3; *bl*, 120/4.7; *rf*, 10R; *wt*, 0.96/2.12; *s*, synthetic; *mag*, 6-shot cylinder.



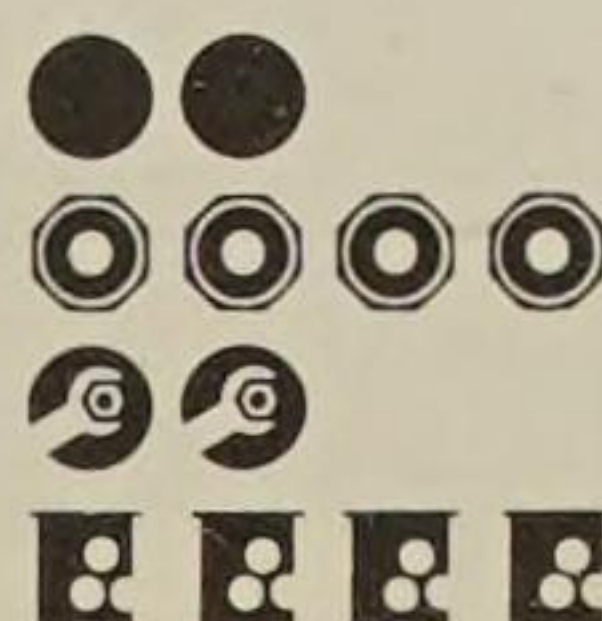
Crosman Model 70 FAC F

This gas-powered single-shot bolt-action rifle, modelled on the Winchester M70, made its début in 1975. Unusual among Crosmans, the majority of which display synthetic Croswood furniture, the M70 has a hand-rubbed hardwood stock. *Type*, fixed barrel bolt-action gas-powered rifle; *cl*, R3/R4; *cal*, 4.5/0.177; *loa*, 1,040/40.9; *bl*, 510/20.1; *rf*, 10R; *wt*, 2.28/5.03; *bs*, synthetic; *sft*, manual.



Crosman Model 73 FAC F

A gas-powered diminutive of the Winchester M1873 lever-action rifle, this Crosman feeds BBs magnetically from its tube magazine, though single diabolo pellets can also be used. The 73, which dates from 1975, was preceded by a smaller gun with a noticeably shorter receiver known as the Model 166. *Type*, fixed-barrel lever-action gas-powered rifle; *cl*, R5; *cal*, 4.5/0.177 (pellet or BB); *loa*, 882/34.7; *bl*, N/A; *rf*, none; *wt*, 1.48/3.26; *s*, synthetic; *mag*, 16-shot tube (BB only).



Crosman 454 FAC F

The gas-powered 454 chambers BBs, forced from a magazine on the right side of the barrel casing. It has a fully adjustable back sight, moulded plastic grips for either hand and a gas cartridge in the grip. See also Model 1600. *Type*, fixed-barrel gas-powered pistol; *cl*, P5; *cal*, 4.45/0.175 (BB); *loa*, 290/11.4; *bl*, 198/7.8; *rf*, none; *wt*, 0.83/1.83; *s*, synthetic; *sft*, manual; *mag*, 16-shot tube (BB).



Crosman M1 Carbine



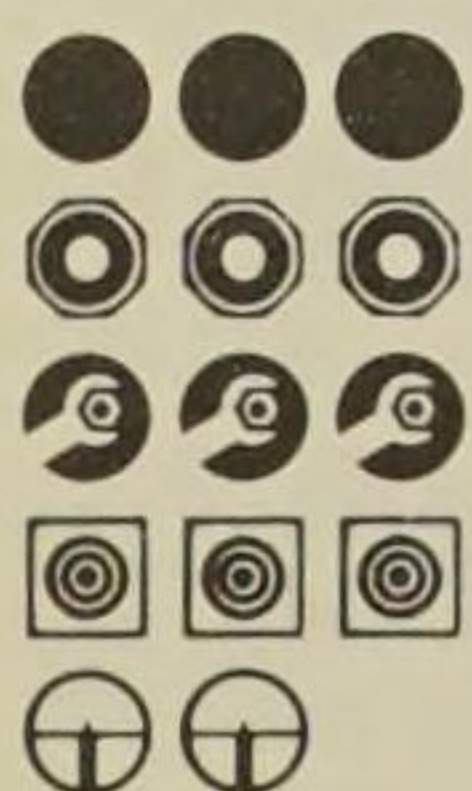
Crosman 760 Powermaster

This accurate and surprisingly consistent BB/pellet gun, introduced in 1966, has a BB magazine on top of the diecast two-piece receiver. The magazine is supplied from an internal reservoir, loaded through a port on the left side. Diabolo pellets may be fed individually into the loading port, however. The brass bolt-handle lies on the right side of the action, while a crossbolt safety may be found on the front web of the trigger guard. The unsophisticated back sight is elevated by (newer guns only) a central stepped slider and pivots laterally by loosening the lock screw. The short-throw pump handle (2 – 10 strokes) masquerades as the fore-end and, like the butt, is brown woodgrained Croswood plastic. *Type*, fixed-barrel, swinging fore-end multi-stroke pneumatic rifle; *cl*, R4; *cal*, 4.5/0.177 (pellet or BB); *loa*, 898/3.54; *bl*, 475/18.7; *rf*, optional 10R; *wt*, 1.80/3.97; *s*, synthetic; *sft*, manual; *mag*, 18-shot tube (BB).



Crosman 760 Powermaster XL

This minor variant of the standard 760 appeared in 1978. The two share the same mechanical characteristics, but the XL has a gold-finish receiver, a large bolt-ball, a Monte Carlo comb and a hooded blade front sight. *Type*, fixed-barrel, swinging fore-end multi-stroke pneumatic rifle; *cl*, R4; *cal*, 4.5/0.177 (pellet or BB); *loa*, 898/3.54; *bl*, 475/18.7; *rf*, optional 10R; *wt*, 1.80/3.97; *s*, synthetic; *sft*, manual; *mag*, 18-shot tube (BB).



Crosman 761 Powermaster XL

This is virtually identical with the 760 XL, but has a polished walnut-finish wood stock and fore-end. Both XL models have been extensively used as the basis for British custom guns (see Marshall, Whaley, page 81). *Type*, fixed-barrel, swinging fore-end multi-stroke pneumatic rifle; *cl*, R4; *cal*, 4.5/0.177 (pellet or BB); *loa*, 898/3.54; *bl*, 475/18.7; *rf*, optional 10R; *wt*, 1.80/3.97; *s*, synthetic; *sft*, manual; *mag*, 18-shot tube (BB).



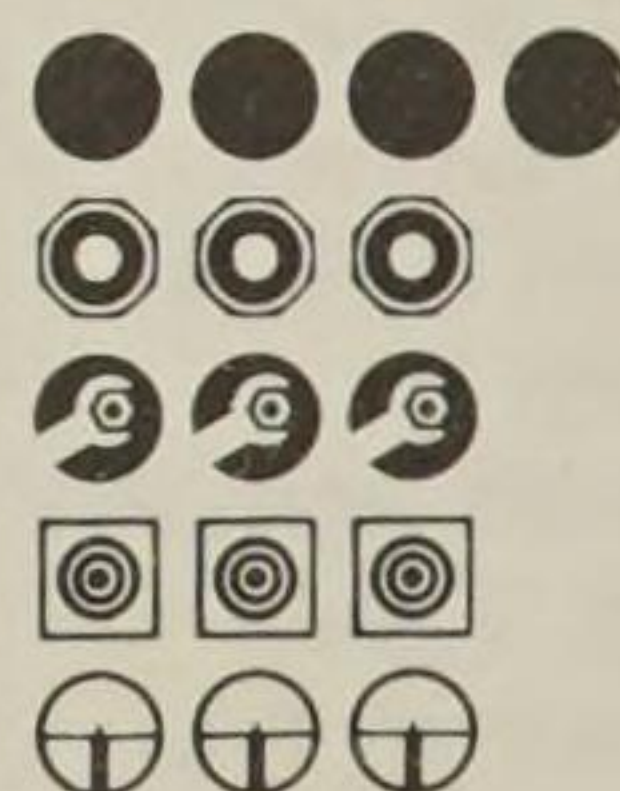
Crosman 766 American Classic

Perhaps the best-looking of the Crosman series, the 766 was modelled on an autoloading Remington and first appeared in 1975. The 'Phase II' model has a visible BB magazine on the left side of the receiver, replenished from a reservoir in the pistol grip, and a variable power long-stroke pump system (2 – 10 pumps). The crossbolt safety lies on the rear web of the trigger guard, where it can be applied with the thumb as the forefinger retracts the hooked cocking handle. The 766 is much easier to cock than the Daisy Powerline 922, but has an inferior trigger pull – a long, creeping 10.5lb. Diabolo pellets may be fed directly



Crosman 788 Scout (or BB Scout)

This small, multi-stroke pneumatic, dating from 1977, is intended for juniors. It shares the basic mechanism of the 760 series, with its crossbolt safety on the rear trigger guard web, but will only fire BBs which, unless suitable precautions are taken, presents ricochet problems. *Type*, fixed-barrel swinging fore-end multi-stroke pneumatic rifle; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 787/31.0; *bl*, 475/18.7; *rf*, none; *wt*, 0.99/2.19; *s*, synthetic; *sft*, manual; *mag*, 22-shot (BB).



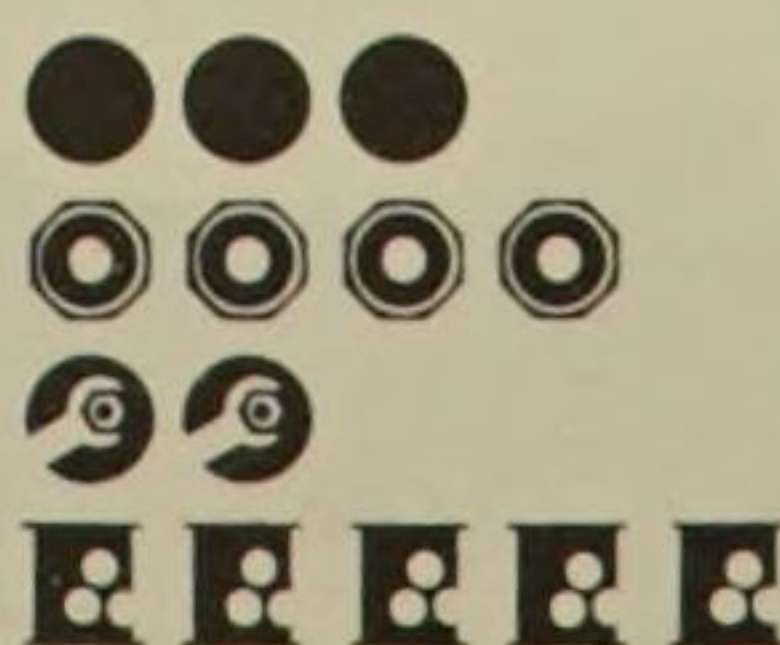
Crosman 1322 Medallist II

The 1322, successor to the obsolete 1300 Medallist, is an all-metal multi-stroke pneumatic with a standard fore-end pump system. It has a long, rifled barrel above the air cylinder, giving good accuracy, and loads through a rotating sliding breech cover – propelling a brass bolt. It is cocked by a knob on the end of the air cylinder. A crossbolt safety lies behind the trigger on the 'crackle finish' black frame. The plastic back sight, adjustable for elevation and with rather limited traverse, lies on the rear of the receiver. The grips and fore-end are of tough Croswood plastic. *Type*, fixed-barrel swinging fore-end multi-stroke pneumatic pistol; *cl*, P1/P2; *cal*, 5.5/0.22; *loa*, 347/13.7; *bl*, 251/9.7; *rf*, 10R; *wt*, 1.12/3.47; *s*, synthetic O-rings; *sft*, manual.



Crosman 1377 American Classic

The 1377 made its début in 1977. It is a smaller-calibre version of the 1322, and shares identical mechanical characteristics. *Type*, fixed-barrel swinging fore-end multi-stroke pneumatic pistol; *cl*, P1/P2; *cal*, 4.5/0.177; *loa*, 347/13.7; *bl*, 251/9.7; *rf*, 10R; *wt*, 1.12/3.47; *s*, synthetic O-rings; *sft*, manual.

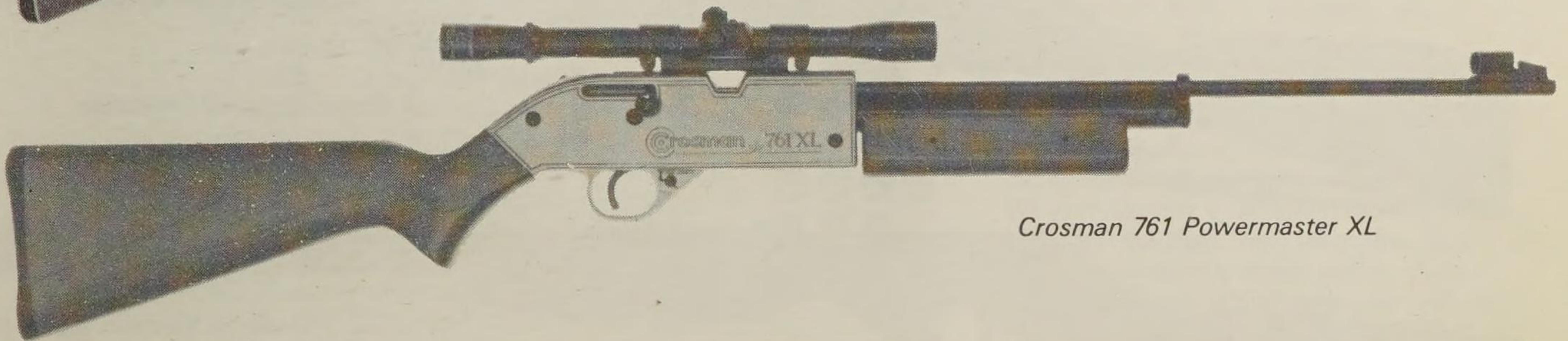


Crosman 1600 Powermatic

The 1600 – introduced in 1978 – is a semi-automatic version of the externally similar 454, feeding BBs from a magazine on the right side of the barrel casing. *Type*, fixed-barrel gas-powered pistol; *cl*, P5; *cal*, 4.45/0.175 (BB); *loa*, 290/11.4; *bl*, 198/7.8; *rf*, none; *wt*, 0.83/1.83; *s*, synthetic; *sft*, manual; *mag*, 16-shot tube (BB).



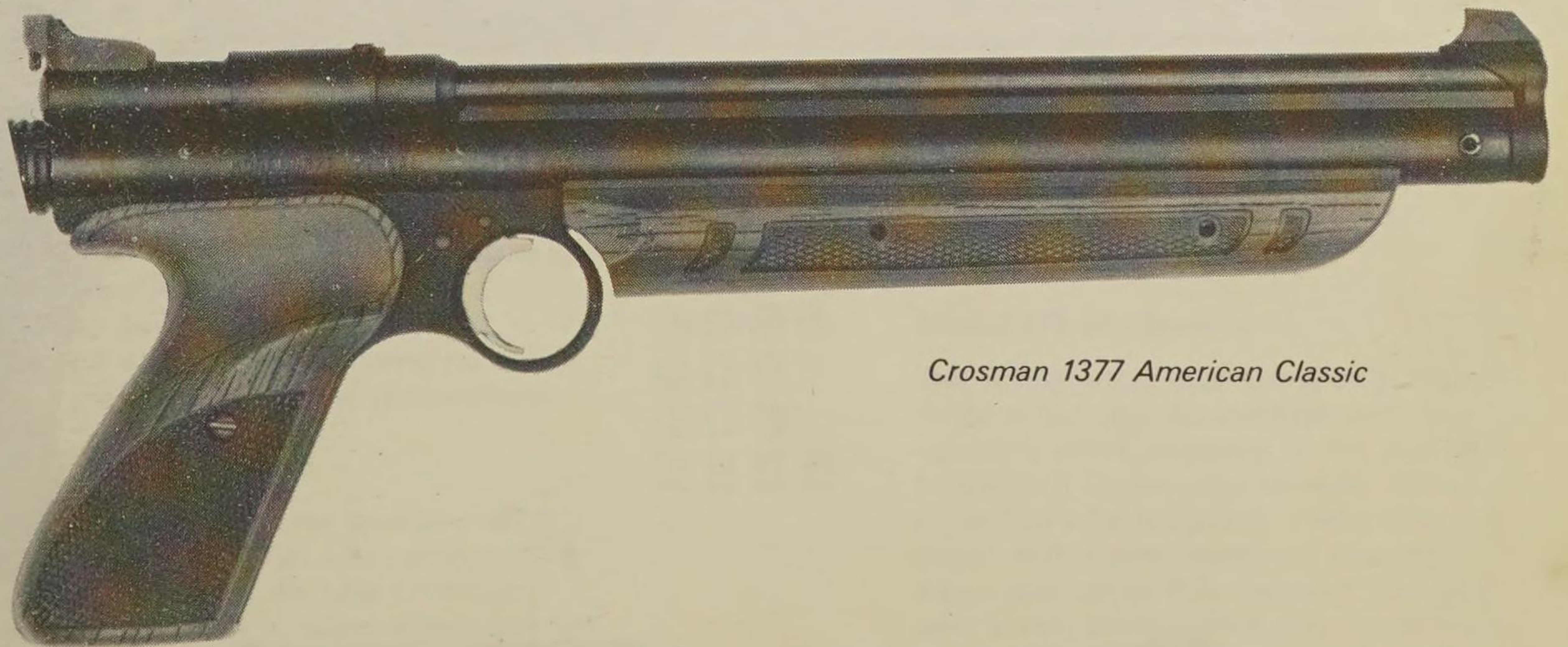
Crosman 760 Powermaster



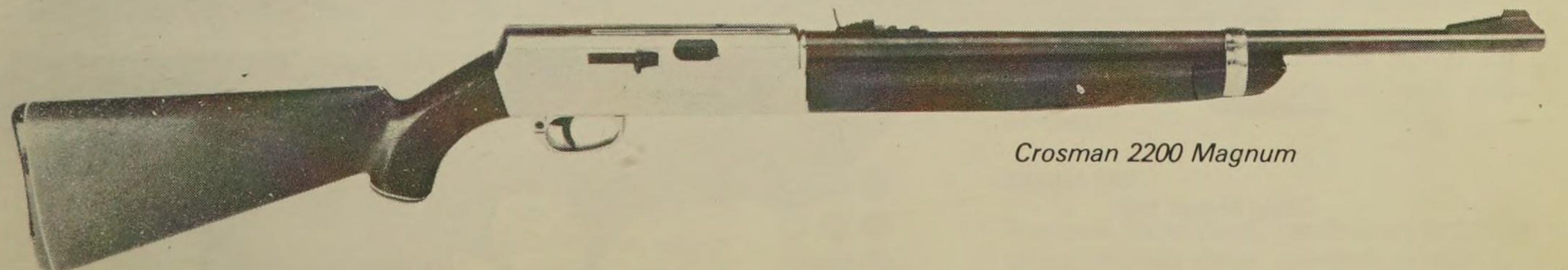
Crosman 761 Powermaster XL



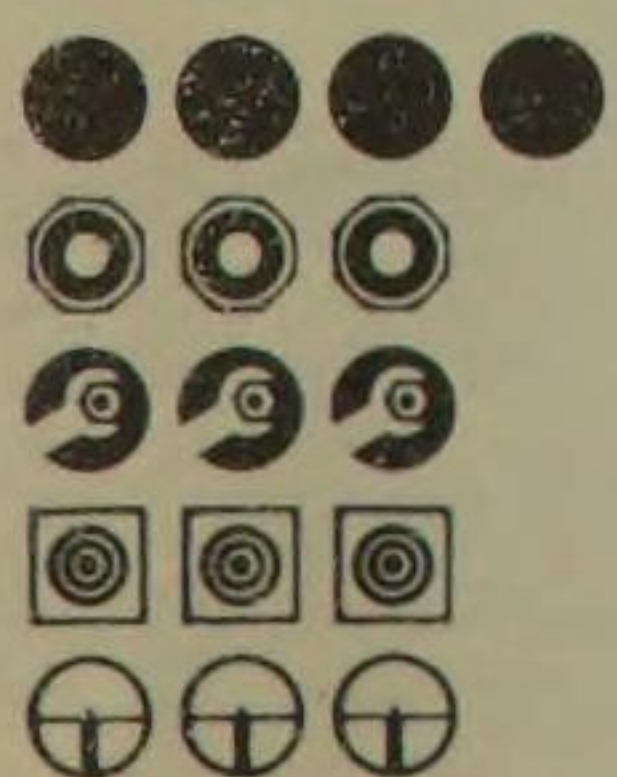
Crosman 766 American Classic



Crosman 1377 American Classic



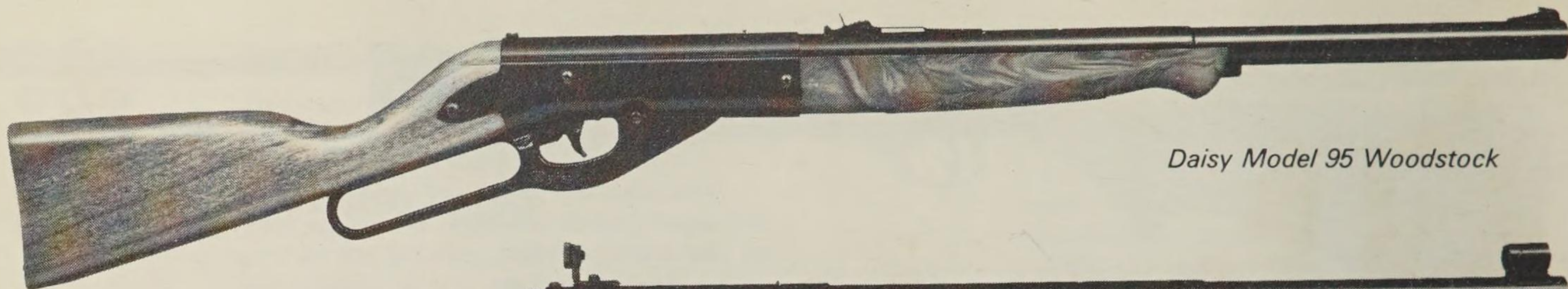
Crosman 2200 Magnum



2200 Magnum (or 2200 Divine) FAC F

The 2200 is a larger-calibre version of the 766 American Classic, and made its début in 1977. The receiver and barrel band are nickel plated, the trigger guard shape has been altered and the receiver is the popular high-backed Browning style. The Croswood butt and fore-end are very dark brown,

contrasting with the rather gaudy nickelling, but the rifle is no toy: the full-power US version will occasionally exceed the British 12fp limit. *Type*, fixed-barrel swinging fore-end multi-stroke pneumatic rifle; *cl*, R2; *cal*, 4.5/0.177 (pellet or BB); *loa*, 985/38.8; *bl*, 533/21.0; *rf*, optional 10R; *wt*, 2.26/4.98; *s*, synthetic; *sft*, manual; *mag*, none.



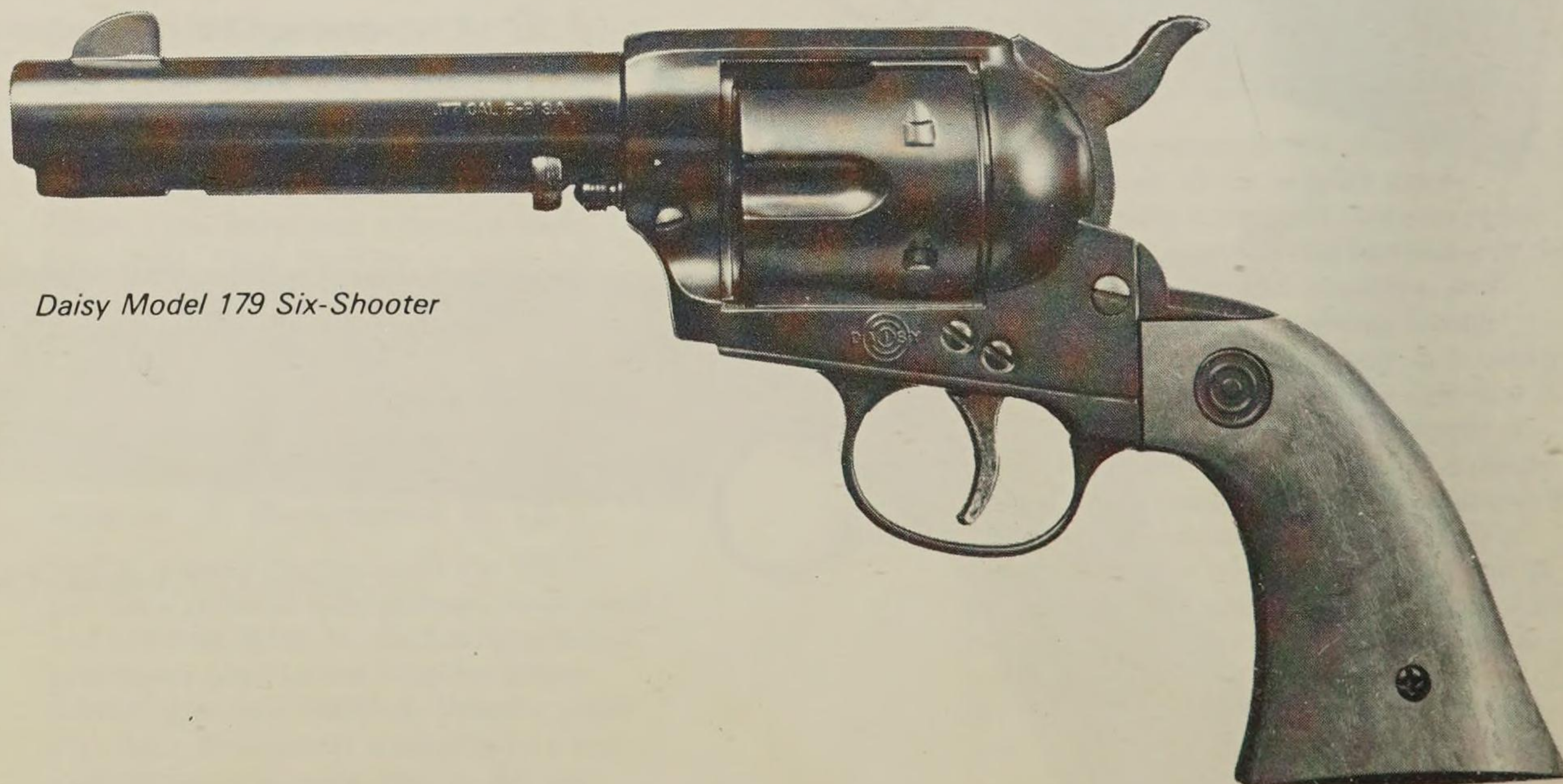
Daisy Model 95 Woodstock



Daisy Model 99 Champion



Daisy Model III Western Carbine



Daisy Model 179 Six-Shooter



Daisy Model 188

DAISY

Daisy, POB 220, Rogers, Arkansas 72756, USA. UK distributors: Millard Brothers Ltd.; Standard warranty: 12 months*

Daisy began life as the Plymouth Iron Windmill Co., whose operations, though initially profitable, declined in the 1880s until it was decided to distribute as a premium item a cheap spring-air BB gun designed by Clarence Hamilton (US 320,297 of 1888). This gun was so successful that windmill production had ceased by 1890 and the Daisy Mfg Co. was constituted in 1895, growing rapidly under the direction of three generations of Houghs – Lewis, Edward and Cass – until it produced more guns than all its rivals combined. The Daisy No.25 pump-action gun, designed in 1913 – 15 by Charles F. Lefever, has alone approached twenty million. The company's post-1945 history is rather tortuous: in 1958 the factory moved from Plymouth, Michigan, to Rogers; and control passed from the Houghs to the Murchison Brothers in 1960. The Murchisons sold out to the Victor Comptometer Corporation in 1967 and Daisy was merged with James Heddon's Sons Company in 1971, regaining its independence in 1974. By 1978, Daisy – and Victor Leisure – had become part of the Kidde, Inc. group.

Daisy has always been regarded as a maker of unsophisticated BB guns; many millions of youngsters have learned to shoot with them before graduating to firearms. Recently, however, the company has developed some greatly improved guns and attempted to rationalize production. Consequently, many obsolete and obsolescent types, some dating no earlier than the 1970s, have been discontinued.

Model 95 Woodstock

A gravity/magnetic feed lever-action BB repeater, the Model 95 was introduced in 1962. It is basically the M99 Champion, with the same HD or heavy-duty frame and action, but standard open sights and a straight gripped butt. The synthetic fore-end has a distinctive schnabel tip. The sights comprise a ramp-mounted blade and an open adjustable spring-leaf with a V-notch, and there is also a manual crossbolt safety. *Type*, fixed-barrel lever-action spring-air gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 890/35.0; *bl*, 457/18.0; *rf*, none; *wt*, N/A; *s*, synthetic; *sft*, manual; *mag*, 700-shot.

Model 99 Champion (or Target Special)

This lever-action BB gun made its début in 1961 with an 850-shot gravity-feed magazine, changed to a 48-shot force-feed in 1960 and a 700 gravity/magnetic type in 1979. The M99 has a heavy barrel casing, a wide or beaver-tail fore-end, a wood butt

with a high comb and semi-pistol grip, and replaceable-insert front and aperture back sights. Swivels and a sling are also fitted. The gun has been widely used by the National Rifle Association, Boy Scouts of America and other organizations for junior shooting programmes. *Type*, fixed-barrel lever-action spring-air gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 922/36; *bl*, 457/18.0; *rf*, none; *wt*, N/A; *s*, synthetic; *sft*, manual; *mag*, 700-shot.

Model 105 Pal (formerly M1105)

A slightly improved modernization of the old M102 Cub, this light-frame lever-action BB gun displays a manual crossbolt safety, a gravity/magnetic feed magazine, and fixed blade/open V-notch sights. *Type*, fixed-barrel lever-action spring-air gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 770/30.3; *bl*, 343/13.5; *rf*, none; *wt*, N/A; *s*, synthetic; *sft*, manual; *mag*, 700-shot.

Model 111 Western Carbine

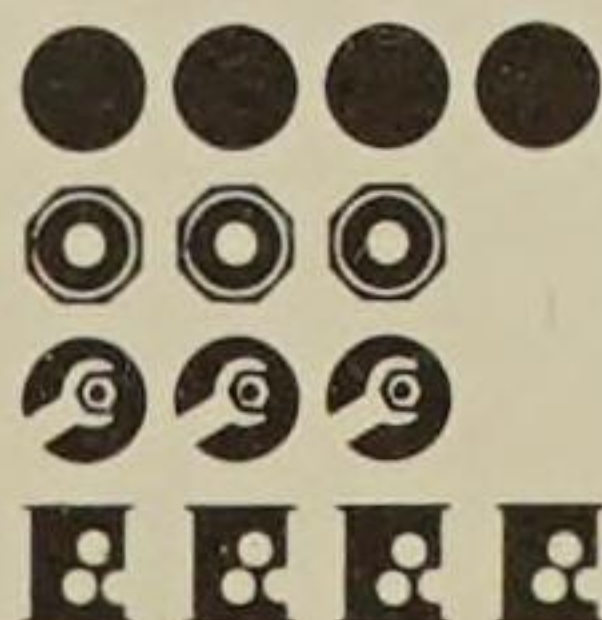
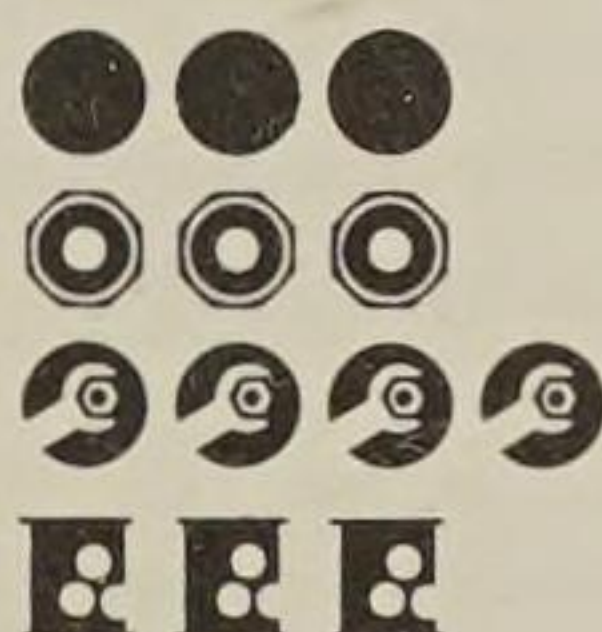
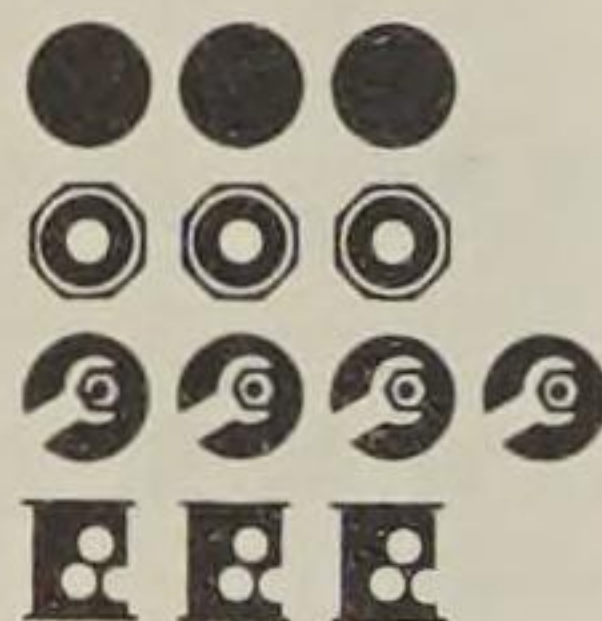
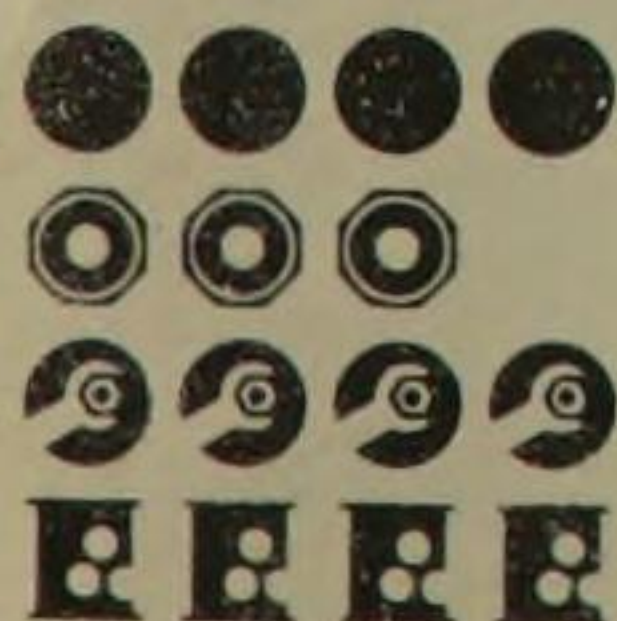
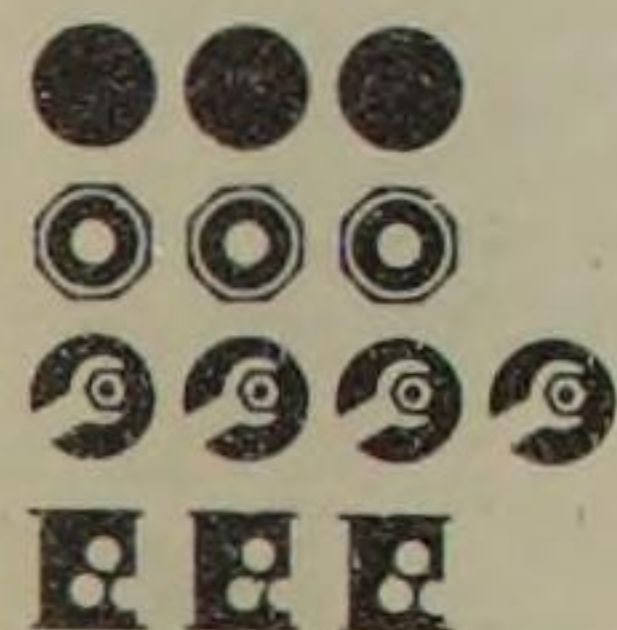
Dating from 1963, this version of the No. 111 M40 Red Ryder lever-action BB gun (1940) now has a gravity/magnetic feed system loaded through an under-barrel port, and standard fixed blade and adjustable open V-notch sights. The receiver displays simulated gold paint-filled 'engraving', and the butt and fore-end are synthetic mouldings. *Type*, fixed-barrel lever-action spring-air gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 890/35.0; *bl*, 457/18.0; *rf*, none; *wt*, N/A; *s*, synthetic; *sft*, manual; *mag*, 650-shot.

Model 179 Six-Shooter

This spring rather than spring-air powered single-action thumbcocked-hammer type repeating pistol, modelled on the popular M1873 Colt Peacemaker revolver, utilizes a force-feed tube magazine. Well made from alloys, with a steel barrel and moulded wood-grain grips, it is a popular 'fun gun' even if very low-powered and accurate only to 20 – 25ft (6 – 8m). *Type*, fixed-barrel spring-powered pistol; *cl*, P5; *cal*, 4.45/0.175 (BB); *loa*, 292/11.5; *bl*, 127/5.0; *rf*, none; *wt*, N/A; *s*, none; *sft*, none; *mag*, 12-shot.

Model 188

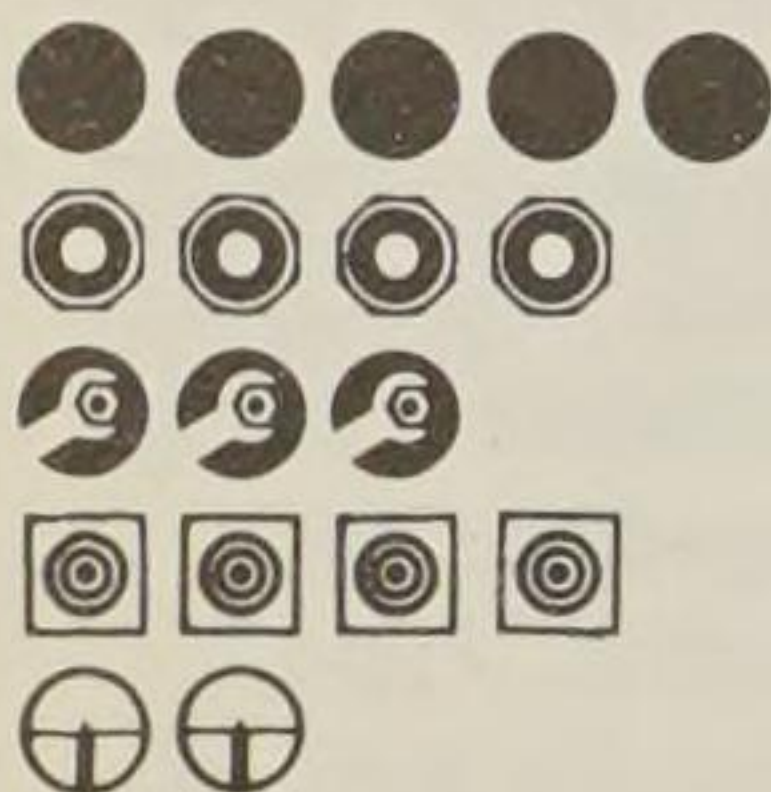
This well made pistol, constructed largely of strong die-cast alloys, appeared in 1979. It has a BB magazine, but will also fire single diabolo pellets at very low velocity, suiting it only to non-serious use. It has fixed sights and a grip similar to the Powerline 717 or 722, for which the 188 makes a useful trainer. *Type*, fixed-barrel underlever-cocking spring-air pistol; *cl*, P5; *cal*, 4.5/0.177 (pellet or BB); *loa*, 305/12.0; *bl*, N/A; *rf*, none; *wt*, N/A; *s*, synthetic; *sft*, manual; *mag*, 24-shot BB.





Model 499 BB Target

This derivation of the 99 Champion, advertised as the world's most accurate BB gun, has a hardwood butt and fore-end, aperture sights and a manual crossbolt safety. It is, however, a muzzle-loading single-shot type rather than a repeater. *Type*, fixed-barrel lever-action spring-air gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 922/36; *bl*, 457/18.0; *rf*, none; *wt*, N/A; *s*, synthetic; *sft*, manual.



Models 717 and 722 Powerline

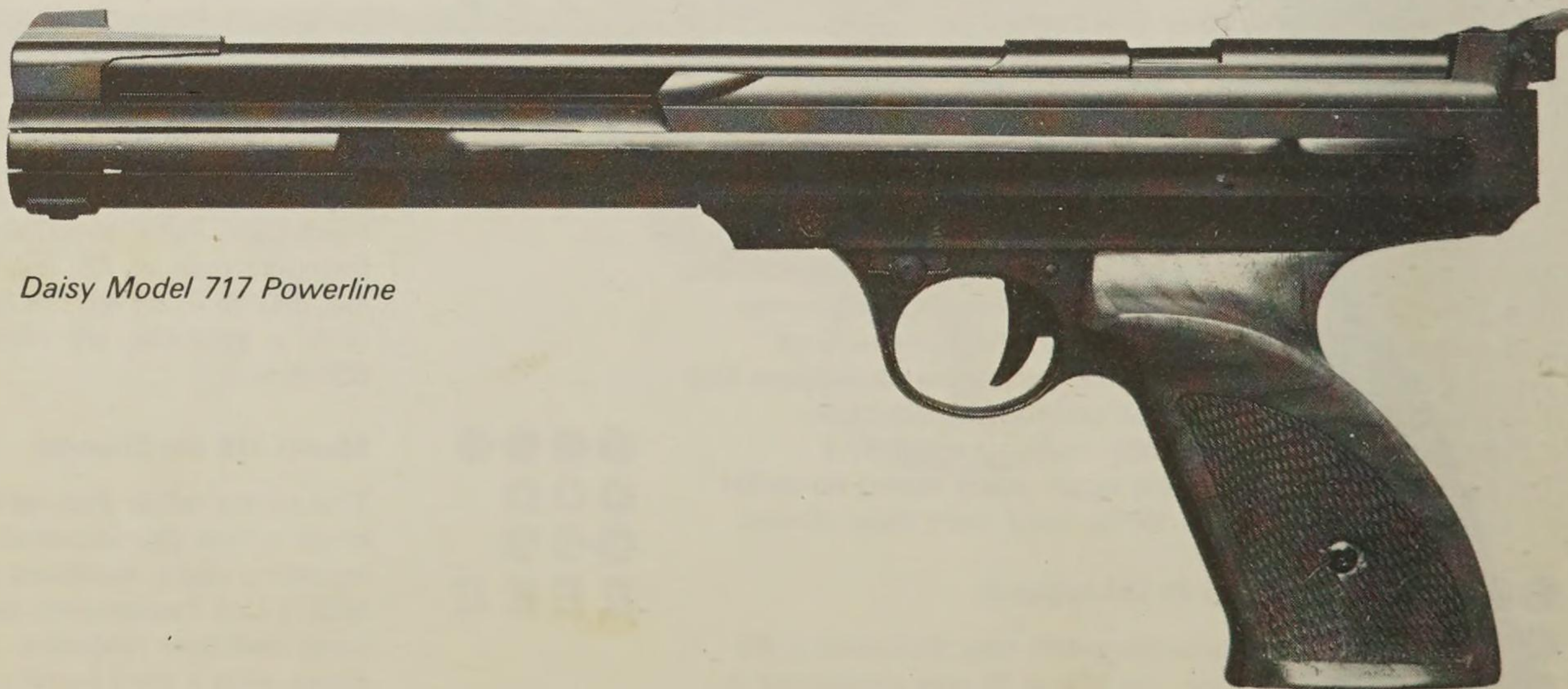
Identical but for calibre, these attractively designed pistols made their début in 1978. With the right pellets they often offer remarkable performance at very low cost and live up to Daisy's "match grade" claims. The pump lever lies on the left side, while cocking and loading are effected by a bolt system whose handle lies on the right side of the breech. A manual trigger-locking crossbolt safety catch lies ahead of the trigger guard, pushed through the frame to the right (safe) or left (fire). The front sight



is a wide blade, the back sight a cleverly designed fully adjustable synthetic open notch, controlled by large slotted-head screws. The Daisies do not have the quality of the Original Diana LP6G – otherwise the cheapest match pistol – as some parts are made of cheap lightweight alloy and their finish lacks durability. However, the 717/722 costs half as much as the Original Diana, is truly recoilless, has a crisp non-adjustable trigger set at 3.4 – 5lb (1.5 – 2.3kg), a very easy cocking stroke and offers good value. *Type*, fixed barrel sidelever-action single-stroke pneumatic pistol; *cl*, C1/C2; *cal*, 4.5/0.177 (717), or 5.5/0.22 (722); *loa*, 339/13.3; *bl*, 233/9.2; *rf*, 12R; *wt*, 1.30/2.87; *s*, synthetic; *sft*, manual.

Model 770 Powerline

Discontinued in 1978, this BB-firing gun is cocked by means of a lever inlet in the underside of the fore-end. It has a gravity-feed magazine, an automatic trigger-blocking safety, hooded blade and adjustable open V-notch sights and a one-



Daisy Model 717 Powerline



Daisy Model 777

Obsolete and recently discontinued Daisy models

Designation	Type	Calibre	Action	Ammunition	Magazine capacity	Date
Model 21 (Model 140, Model 410)	rifle, smoothbore	BB	break-open	BB	2 × 48	1940 – 75
Model 25	rifle, smoothbore	BB	pump	BB	46	1914 – 79
Model 26 (Model 572 Fieldmaster)	rifle, smoothbore	BB	pump	BB	45	1964 – 73
Model 62 (El Gamo Center)	pistol, rifled	4.5/0.177	underlever	diabolo	NA	1975 – 78
Model 65 (Feinwerkbau LP65)	pistol, rifled	4.5/0.177	sidelever	diabolo	NA	1971 – 78
Model 96	rifle, smoothbore	BB	lever-action	BB	700	1963 – 75
Model 98; Monte Carlo	rifle, smoothbore	BB	lever-action	BB	700	1958 – 77
Model 102 Club	rifle, smoothbore	BB	lever-action	BB	350	1965 – 77
Model 104; Golden Eagle	rifle, smoothbore	BB	lever-action	BB	350	1964 – 77
Model 160 (Original Diana 16)	rifle, rifled	4.5/0.177	break-barrel	diabolo	NA	mid-1970s
Model 162 (as 62 with left-hand grips)	pistol					
Model 165 (as 65 with left-hand grips)	pistol					
Model 177	pistol, smoothbore	BB	slide action	BB	150	1958 – 77
Model 200	pistol, smoothbore	BB	gas	BB	5 (175 in reservoir)	1972 – 79
Model 230 (Original Diana 23)	rifle, rifled	4.5/0.177	break-barrel	diabolo	NA	mid-1970s
Model 250 (Original Diana 25)	rifle, rifled	4.5/0.177	break-barrel	diabolo	NA	mid-1970s
Model 300	carbine, smoothbore	BB	gas	BB	5 (175 in reservoir)	1972 – 79
Model 400 Rota-Clip	rifle, smoothbore	4.5/0.177	lever-action	diabolo	5	1972 – 75
Model 404 Rota-Clip (Model 7404)	rifle, smoothbore	4.5/0.177	lever-action	diabolo	5	1973 – 75
Model 450 Rota-Clip	rifle, rifled	4.5/0.177	lever-action	diabolo	5	1972 – 75
Model 453 Rota-Clip; Target	rifle, rifled	4.5/0.177	lever-action	diabolo	5	1974 – 75
Model 454 Rota-Clip	rifle, rifled	4.5/0.177	lever-action	diabolo	5	1973 – 75
Model 572 (see Model 26)	rifle					1968 – 71
Model 1776 Bicentennial (see Model 104)	rifle					1968 – 77
Model 3300 (see Model 300; fitted with 4X M808 telescope sight)	carbine					1972 – 79
Model 4300 (Feinwerkbau LG300)	rifle, rifled	4.5/0.177	sidelever	diabolo	NA	1970 – 77
Model 4301 (Feinwerkbau LG300S)	rifle, rifled	4.5/0.177	sidelever	diabolo	NA	1975 – 77

piece synthetic stock, with a pistol grip, cheekpiece and Monte Carlo comb. *Type*, fixed-barrel underlever-action single-stroke spring-air gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 942/37.1; *bl*, 478/18.8; *rf*, none; *wt*, 1.84/4.06; *s*, synthetic; *sft*, automatic; *mag*, 200-shot.



Model 777

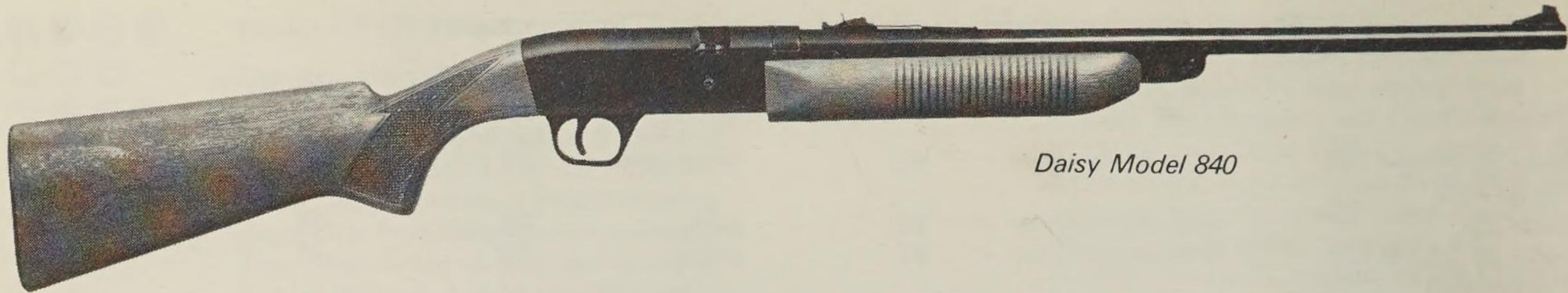
Introduced in January 1981, this is an improved version of the 717 (qv), with non-adjustable palm-rest type walnut grips, a trigger adjustable from 1 to 3lb (0.5 – 1.3kg) and an improved micro-adjustable back sight. The 777 promises outstanding performance at a very



competitive price. *Type*, fixed-barrel sidelever-action single-stroke pneumatic pistol; *cl*, C1/C2; other details generally as Model 717.

Models 780 and 790

These are the Smith & Wesson 78G and 79G carbon-dioxide powered target pistols, which Daisy began to produce in November 1980. (See also entry for Models 78G and 79G, page 98.) *Type*, fixed-barrel gas-powered pistol; *cl*, C2:P2; *cal*, 5.5/0.22 (780), 4.5/0.177 (790); *loa*, 279/11.0; *bl*, 216/8.5; *rf*, 10R; *wt*, 1.15/2.54; *s*, synthetic; *sft*, manual.



Daisy Model 840



Daisy Model 850



Daisy Model 880 Powerline



Daisy Model 1880 Powerline



Daisy Model 1917 Powerline

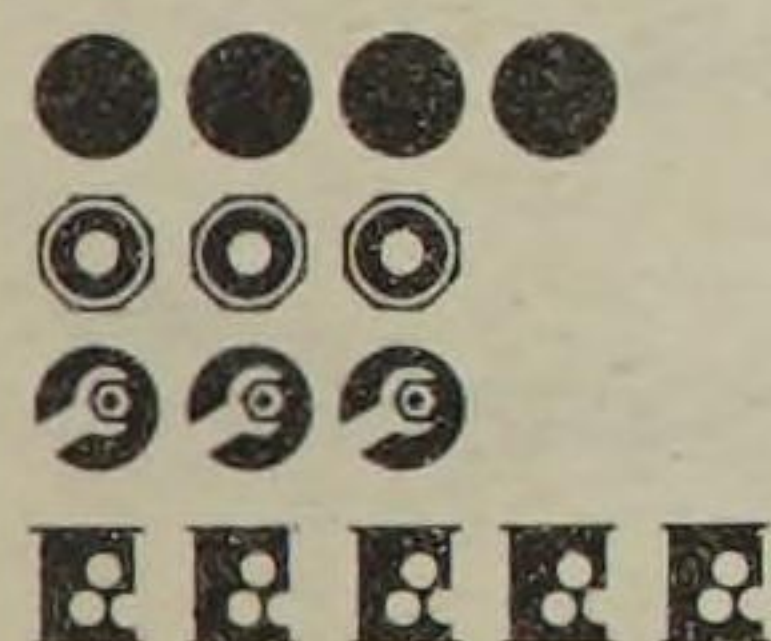


Daisy Model 917 Powerline



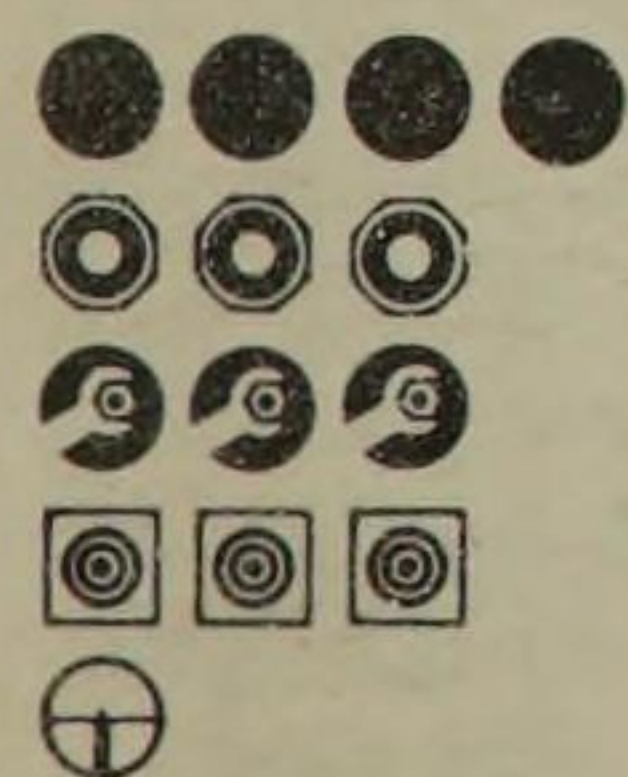
Model 822 Powerline

This was an early improved Daisy rifle, a sophisticated rifled single-shot pneumatic firing diabolo pellets. The multi-stroke system, 1 – 10 pump strokes, permits controlled velocity. The gun has particularly elegant lines, with most of the pump lever hidden in the fore-end. The die-cast alloy receiver has a burnished finish, integral telescope sight rails and a crossbolt safety ahead of the trigger. The synthetic butt and fore-end display chequering, and there are white plastic spacers between the butt, the black plastic butt-plate and the pistol-grip cap; a contrasting diamond is inlet in the fore-end sides. The ramp-mounted blade front sight is complemented by a coarsely adjustable open V-notch, with a sliding stepped elevator and a screw-locked laterally-pivoting leaf. The Daisy has a much crisper constant-pressure trigger than the Crosman 766 (4.2 against 10.4lb on the test guns), but its straight-pull bolt handle gives inferior leverage during the cocking/loading stroke. The rifled barrel liner gives quite good accuracy. *Type*, fixed-barrel underlever-action multi-stroke pneumatic rifle; *cl*, R3; *cal*, 5.5/0.22; *loa*, 956/37.6; *bl*, 528/20.8; *rf*, 10R; *wt*, 2.12/4.67; *s*, synthetic; *sft*, manual.



Model 840

This low-power single-stroke junior pneumatic, dating from 1978, will fire single diabolo pellets or BBs from the gravity-feed magazine. It has a synthetic receiver and a straight-pull cocking/loading bolt stroke. The pistol-gripped butt and ribbed fore-end are moulded synthetics, while the sights comprise an open blade and an adjustable spring-leaf and stepped sliding elevator unit. *Type*, fixed-barrel underlever-action single-stroke pneumatic gun; *cl*, R5; *cal*, 4.5/0.177 (pellet or BB); *loa*, 940/37.1; *bl*, 478/18.8; *rf*, none; *wt*, 1.84/4.06; *s*, synthetic; *sft*, semi-automatic; *mag*, 350-shot.



Model 845

This derivative of the 840 has a receiver-top mount for an aperture sight, either a simple peep type or the new micro-adjustable M5845. The result offers quite good performance at a very competitive price, ideal for the beginner. *Type*, fixed-barrel underlever-action single-stroke pneumatic gun; *cl*, R5; *cal*, 4.5/0.177 (pellet or BB); *loa*, 940/37.1; *bl*, 478/18.8; *rf*, none; *wt*, 1.84/4.06; *s*, synthetic; *sft*, semi-automatic; *mag*, 350-shot.



Model 880 Powerline

This variant of the 822 fires single diabolo pellets or BBs from the gravity-feed magazine. It has a black-finish receiver and lacks the distinctive fore-end diamonds. *Type*, fixed-barrel underlever-action multi-



Model 881 Powerline

An 880 with a burnished receiver.

Model 850

The 850 – scheduled to appear in March 1981 – is a single-stroke pneumatic based on the Powerline series and sharing similar lines. However, it has a distinctive one-piece synthetic stock and generates rather less power than the 917 and 922 (qv). It is rather less tiring to operate on account of the advantageous single stroke. *Type*, fixed barrel underlever-action single-stroke pneumatic rifle; *cl*, R5; *cal*, 4.5/0.177 (pellet or BB); *loa*, 978/38.5; *bl*, not known; *rf*, 10R?; *wt*, 1.81/4.00; *s*, synthetic; *sft*, manual; *mag*, 100-shot BB.



Model 882 Powerline

This target-shooting derivative of the 881, made for the National Air Pellet Program, had a replaceable-element tunnel front sight and a micro-adjustable Williams aperture sight on the receiver. It had the burnished receiver but lacked the white spacers on the butt. See 880 Powerline for details.



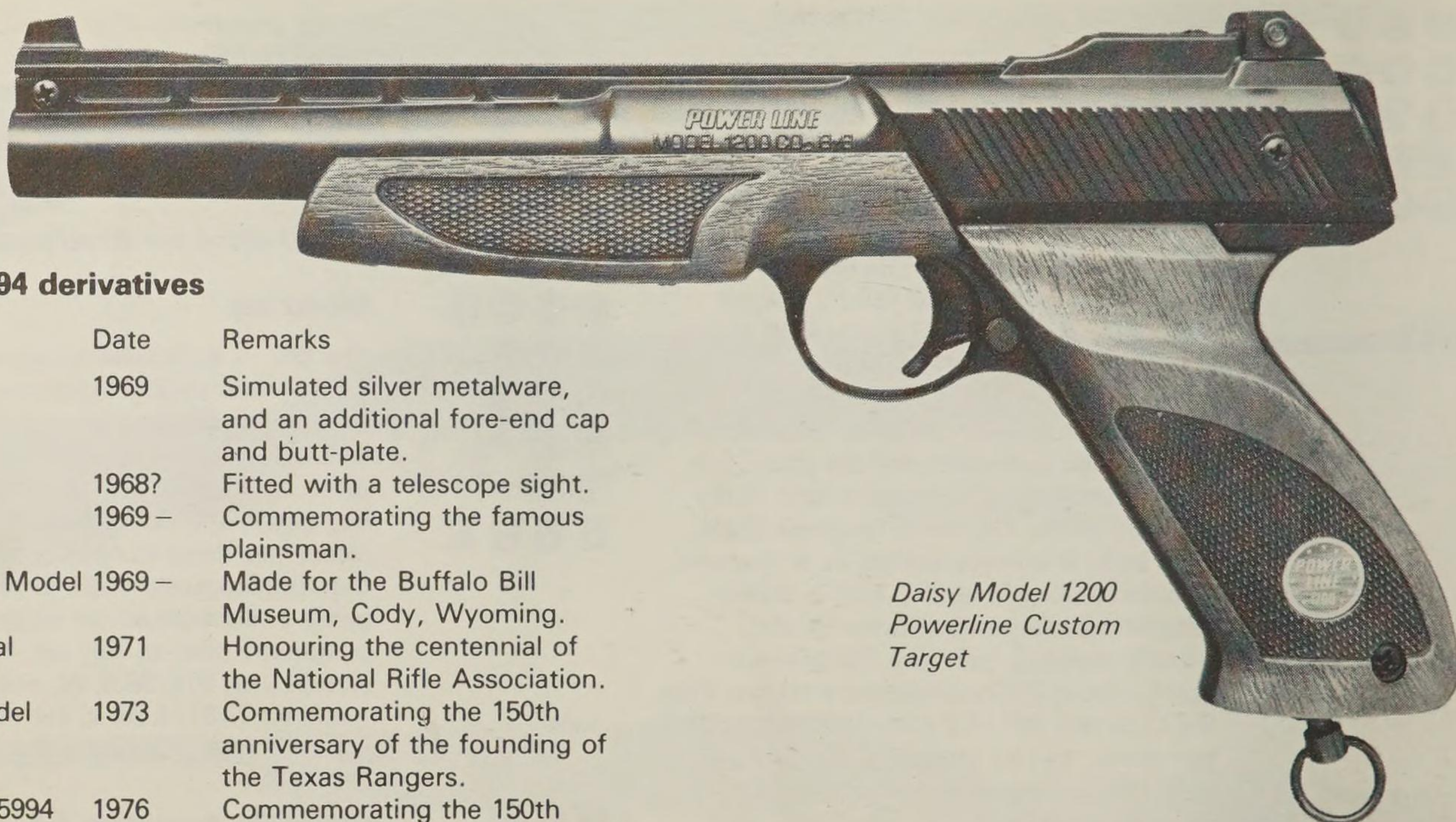
Models 917 and 922 Powerline

These derivations of the 822 appeared in 1978/79, with a transverse synthetic en bloc 'clip' magazine – or optional single shot adaptor – running through the die-cast alloy receiver. The five diabolo pellets it can contain are pushed into the barrel by the bolt-head after the magazine has been manually indexed for each shot, a fascinating idea that would benefit from a rather better location-system. The rifles usually feed more easily with small-diameter German-style pellets, as many others require considerable seating force. The application of this force is hindered by the short bolt-handle, which prevents easy manipulation. The 917 and 922 differ only in calibre and have black receivers with pressed-in gold-filled decoration. Like their prototypes, they are capable of surprisingly good performance. *Type*, fixed-barrel underlever-action multi-stroke pneumatic rifle; *cl*, R3; *cal*, 4.5/0.177 (917), 5.5/0.22 (922); *loa*, 956/37.6; *bl*, 528/20.8; *rf*, 10R; *wt*, 2.18/4.81; *s*, synthetic; *sft*, manual; *mag*, 5-shot block-type clip.



Model 977 Powerline Target

This is simply a 917 with a replaceable-element tunnel pattern front sight and a receiver-top mount for the M5845 micro-adjustable aperture unit. See Model 917 for details.



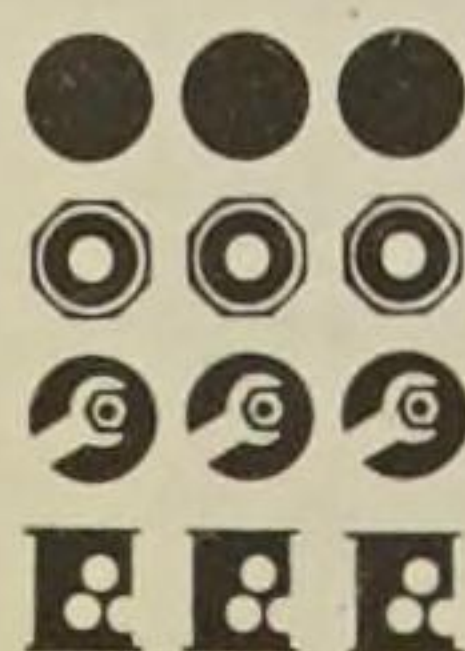
*Daisy Model 1200
Powerline Custom
Target*

Special M1894 derivatives

Model	Date	Remarks
M3030	1969	Simulated silver metalware, and an additional fore-end cap and butt-plate.
M3894	1968?	Fitted with a telescope sight.
Buffalo Bill	1969 –	Commemorating the famous plainsman.
Cody Museum Model	1969 –	Made for the Buffalo Bill Museum, Cody, Wyoming.
NRA Centennial M5894	1971	Honouring the centennial of the National Rifle Association.
Centennial Model	1973	Commemorating the 150th anniversary of the founding of the Texas Rangers.
Wells Fargo M5994	1976	Commemorating the 150th anniversary of the famous mail company.

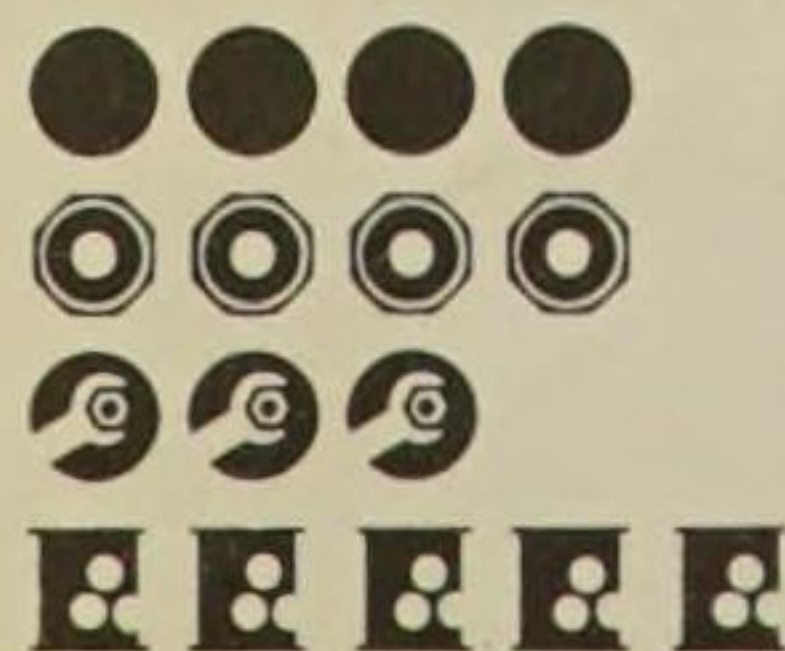


Daisy Model 1894 Spittin' Image



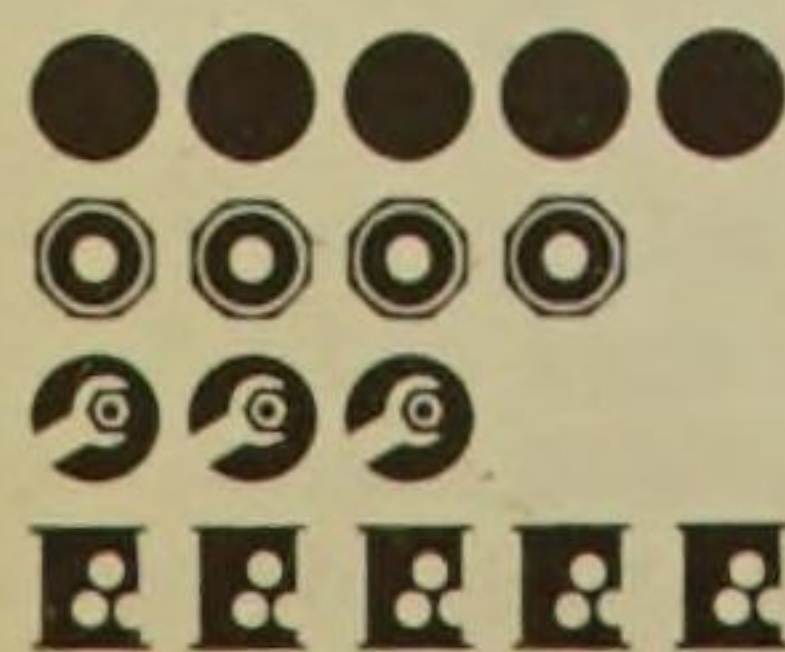
Model 1188

The 1188 is a minor derivative of the 188. It is capable of firing only BBs from its 24-shot magazine. *Type*, fixed-barrel underlever-cocking spring-air pistol; *cl*, P5; *cal*, 4.45/0.175 (BB); *loa*, 305/12.0; *bl*, N/A; *rf*, none; *wt*, N/A; *s*, synthetic; *sft*, manual; *mag*, 24-shot BB.



Model 1200 Powerline Custom Target

This carbon dioxide powered pistol, modelled on the Browning Medallist, is cocked by a slide in the aperture under the frame ahead of the trigger. It has a fully adjustable target-type back sight, synthetic grips and a short synthetic fore-end, but its accuracy is no match for the pneumatic 717 or 722. *Type*, fixed-barrel gas-powered slide-cocking pistol; *cl*, P5; *cal*, 4.45/0.175 (BB); *loa*, 308/12.1; *bl*, 8.2/208; *rf*, none; *wt*, 0.85/1.87; *s*, synthetic; *sft*, manual; *mag*, 60-shot.



Model 1894 Spittin' Image

This facsimile of the M1894 Winchester made its debut in 1961. It features a sidegate-type loading port on the receiver, a tube magazine under the barrel, an automatic hammer safety, adjustable sights,



and an action that cocks partly on opening and the remainder on closure. *Type*, fixed-barrel lever-action spring-air gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 973/38.3; *bl*, 445/17.5; *rf*, none; *wt*, 2.15/4.74; *s*, synthetic; *sft*, automatic; *mag*, 40-shot.

Model 1938 Red Ryder Commemorative

This BB gun is a derivation of the M111 Western Carbine, with a hardwood butt and fore-end; the former displays a mounted cowboy and 'Red Ryder' formed by his lariat. A sling ring and a leather thong lie on the left side of the receiver above the trigger guard. *Type*, fixed-barrel lever-action spring-air gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 920/36.3; *bl*, 457/18.0; *rf*, none; *wt*, N/A; *s*, synthetic; *sft*, manual; *mag*, 650-shot.

Powerline guns fitted with the M808 4X telescope sight

This applies to designations 770, 822, 880, 881, 882, 917 and 922, all of which are prefixed with the figure '1'; for example, Model 770 becomes Model 1770.

EL GAMO

Industrias El Gamo SA, Carretera Sta Cruz de Calafell, Km.10, San Baudilio de Llobregat, Barcelona, Spain; Sao Paulo, Brazil. UK distributor: ASI; US distributor: Stoeger Industries; Standard warranty: 6 months?

El Gamo, the principal airgun manufacturer in the Iberian Peninsula and also one of the largest in Europe, was founded in 1960. Very rapid prominence has been achieved as a result of producing, according to the company's literature, 'medium-high quality at medium-low price'. By 1980, El Gamo wares were being sold in 46 countries, and a workforce of 120 was making about 200,000 guns annually. The Brazilian subsidiary satisfies most of the US demands.

Modelo Cadet

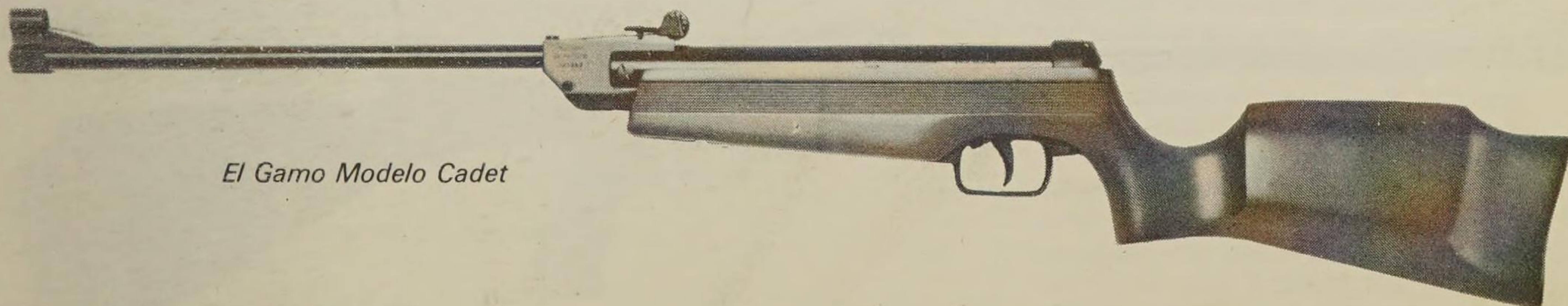
This junior rifle, introduced in 1979, shares many of the Expo 200 parts: sights, receiver, piston system and barrel. However, the new trigger incorporates a pivoted safety lever, which is applied automatically on cocking, and must be reset manually before each shot. The catch-head in front of the trigger is simply pressed upwards. The wood pistol-gripped stock has the squared contours of the



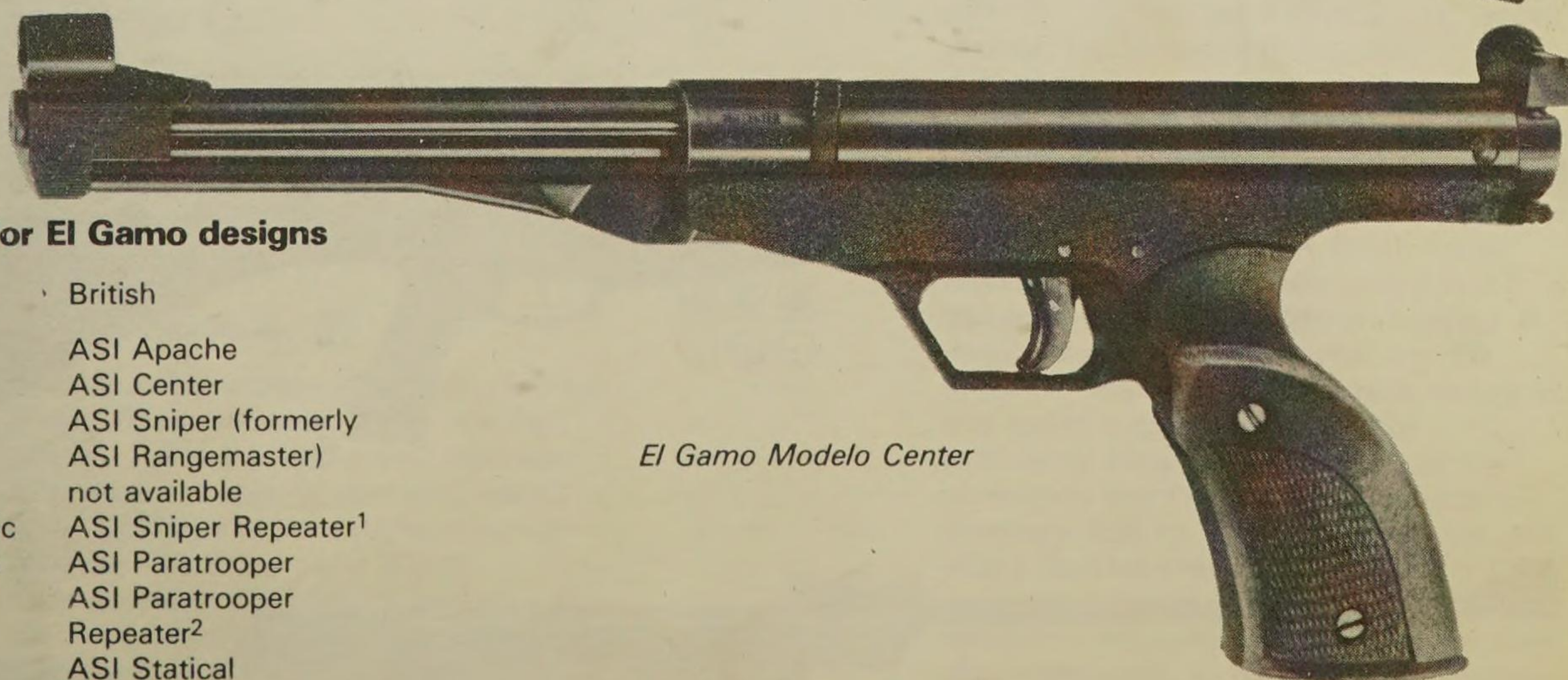
Expomatic, very distinctive longitudinal grooves on the fore-end, a thin metal butt-plate and a better shaped trigger/trigger guard assembly. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4; *cal*, 4.5/0.177; *loa*, 940/37.0; *bl*, 380/15.0; *rf*, 12R; *wt*, 2.07/4.56; *ps*, leather washer; *bs*, neoprene O-ring; *sft*, semi-automatic.

Modelo Center

Dating from 1973, this popular low-cost target pistol offers some unusual features, though its mechanism is quite conventional. The well finished, blued air cylinder, barrel and articulated cocking lever contrast with the black crackle-finish frame, which carries the unique right- or left-hand plastic grips; the grip part of the frame may be loosened to alter the angle between the grip and the bore axis. The Center also has an ingenious floating loading port, swinging to the left and efficiently sealed as the piston flies forward. The sights comprise a blade with a removable hood and a micro-adjustable open notch, controlled by discs under the receiver and on the right side of the sight block. *Type*, fixed-barrel underlever-cocking spring-air pistol, loaded through a pivoting port; *cl*, C3:P4; *cal*, 4.5/0.177; *loa*, 378/14.8; *bl*, 180/7.2; *rf*, 12R; *wt*, 1.30/2.87; *ps*, leather washer; *sft*, none.



El Gamo Modelo Cadet



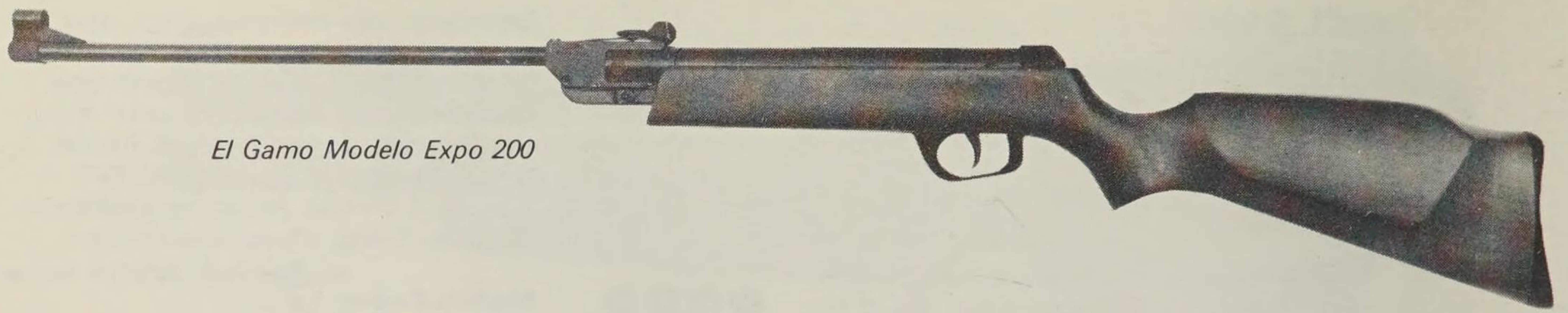
El Gamo Modelo Center

Designations for El Gamo designs

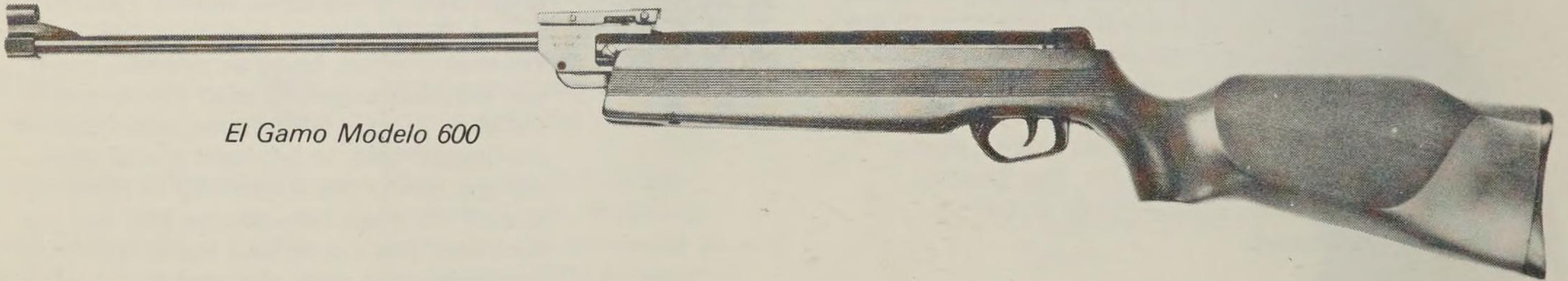
Spanish	British
Modelo Cadet	ASI Apache
Modelo Center	ASI Center
Modelo Expo or	ASI Sniper (formerly
Modelo 200	ASI Rangemaster)
Modelo 300	not available
Modelo Expomatic	ASI Sniper Repeater ¹
Modelo Gamo 68	ASI Paratrooper
Modelo Gamatic	ASI Paratrooper
	Repeater ²
Modelo Statical	ASI Statical
Modelo 600	not available

¹US designation formerly Precise Minuteman Mk 1.

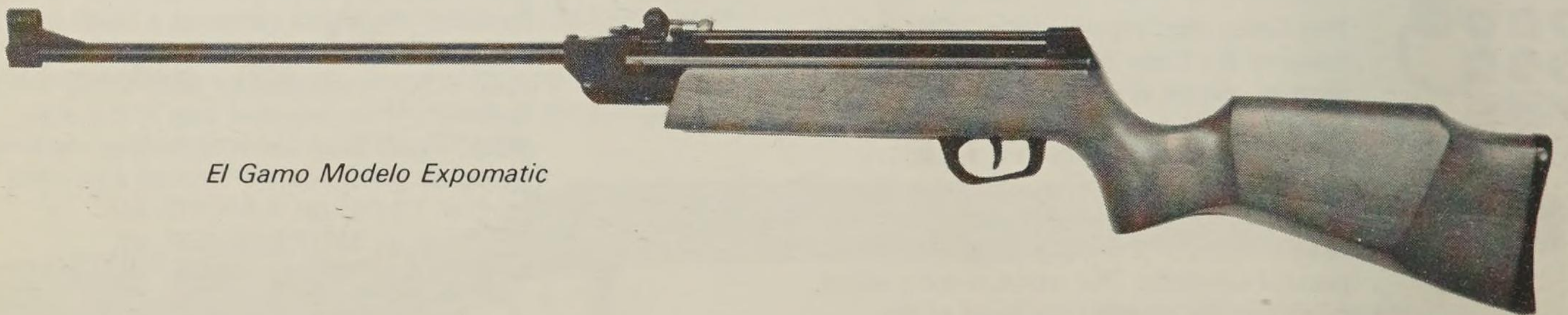
²US designation formerly Precise Minuteman Mk 2.



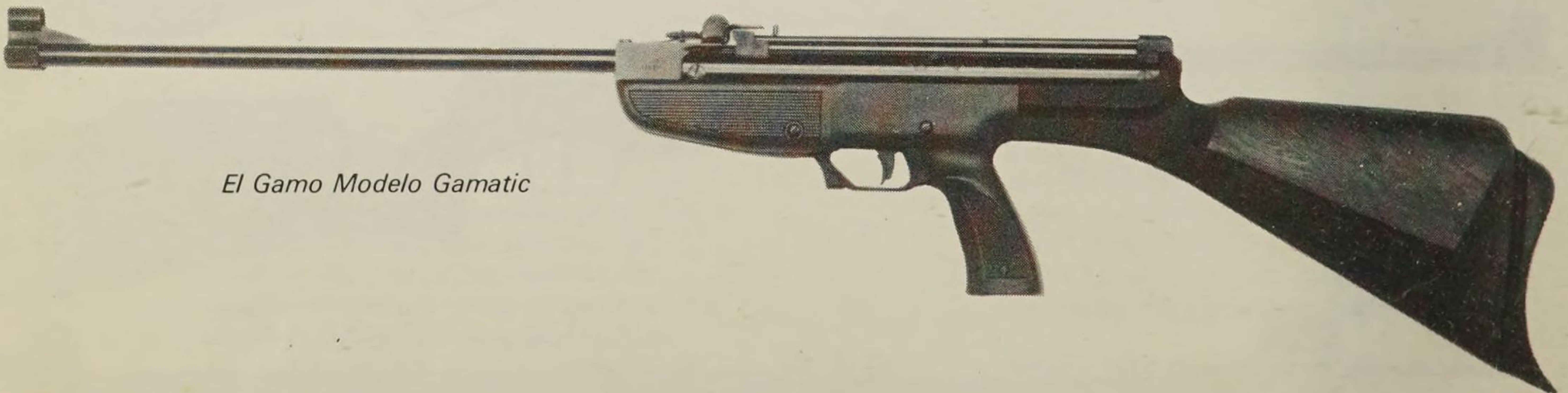
El Gamo Modelo Expo 200



El Gamo Modelo 600



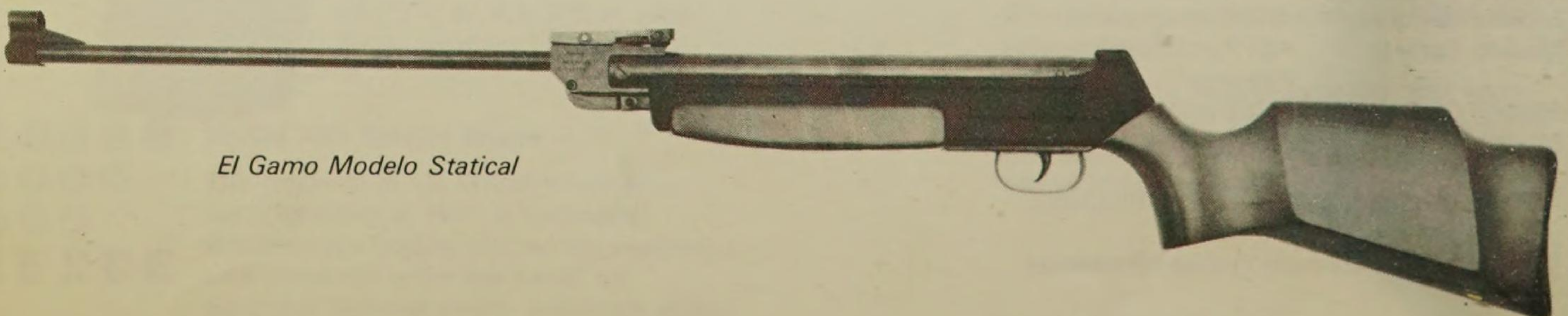
El Gamo Modelo Expomatic



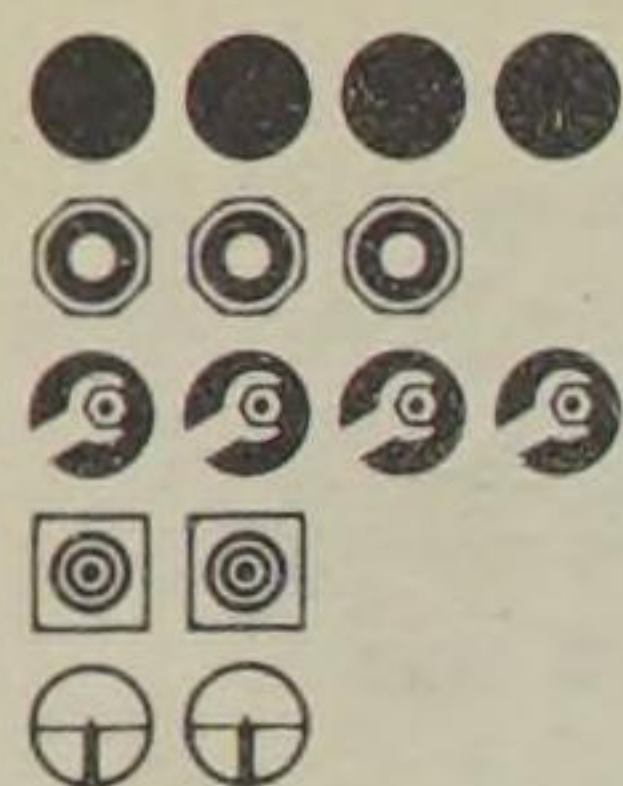
El Gamo Modelo Gamatic



El Gamo Modelo Gamo 68

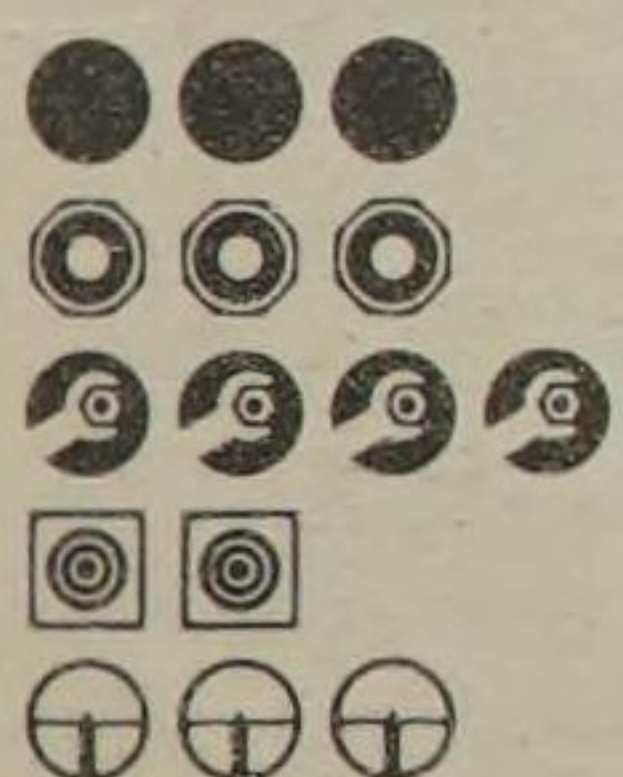


El Gamo Modelo Statical



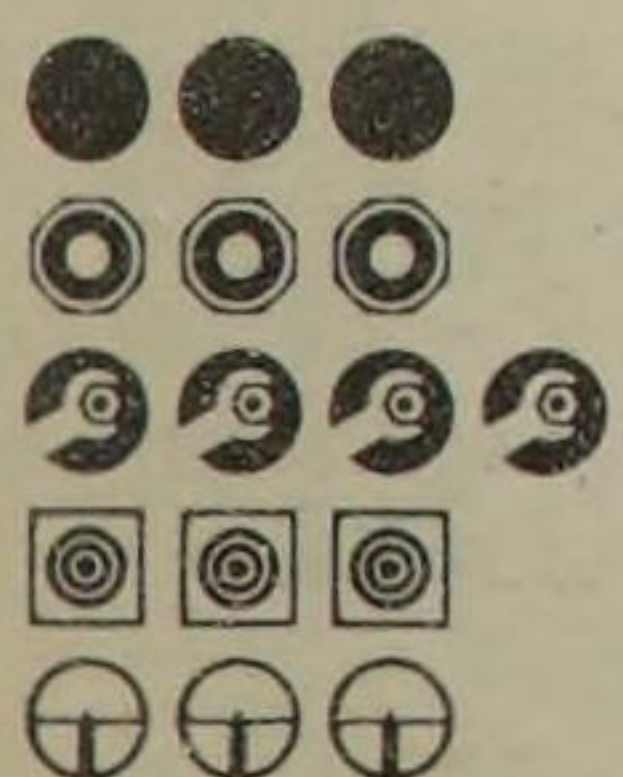
Modelo Expo 200

The handy, well-balanced Expo 200, widely distributed outside Spain, was developed in the 1960s. It offers reasonable quality at low cost, though it is not especially sophisticated. The cocking lever is articulated, the trigger a rather coarse two-stage design adjustable for travel but not pull-weight, which is set at 7–11lb (3–5kg). The micro-adjustable open-notch spring-leaf back sight, complementing the hooded blade, is controlled by very clearly graduated plastic discs. The beech stock displays good external finish but less impressive inletting; newer stocks have a cheekpiece, in addition to the black plastic butt-plate, and a plain rather than grooved fore-end. The trigger guard is an unattractive moulding and the trigger lever – a light stamping – lies rather far forward of the pistol grip for the small-handed or short-fingered marksman. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,028/41.5; *bl*, 450/17.7; *rf*, 12R; *wt*, 2.41/5.31; *ps*, leather washer; *bs*, neoprene O-ring; *sft*, none.



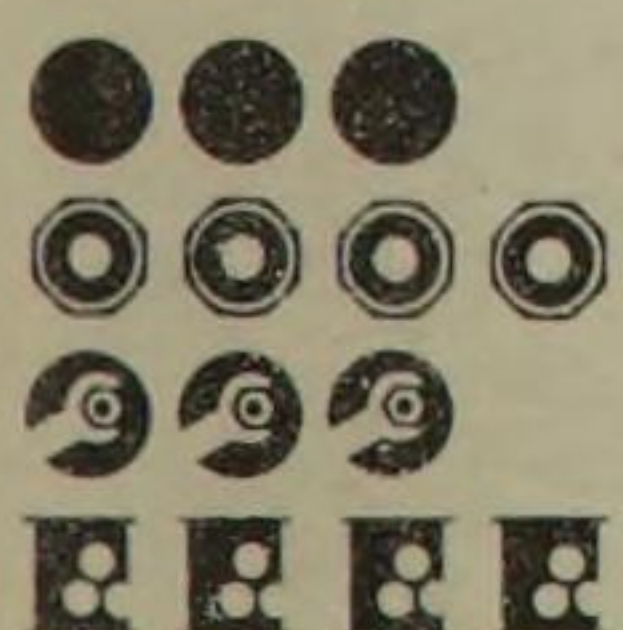
Modelo 300

Fairly rare in Britain, but more common in the USA, this is simply a larger version of the Expo 200 with a longer receiver and piston stroke, and greater power. There are few external differences, though the fore-end tip of the 300 is rounded rather than oblique-cut; the fore-end itself is considerably deeper. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,090/42.9; *bl*, 450/17.7; *rf*, 12R; *wt*, 3.02/6.65; *ps*, leather washer; *bs*, neoprene O-ring; *sft*, none.



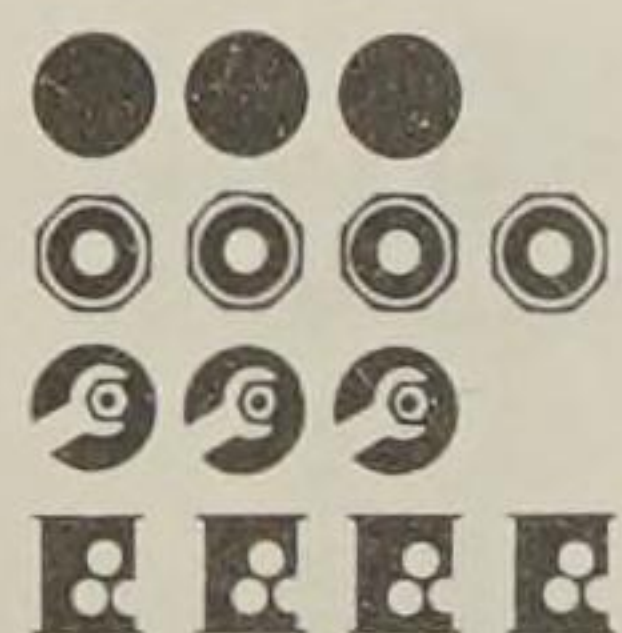
Modelo 600

This gun, introduced in 1979 and still rare outside Spain, is an improved Modelo 300, with a better-shaped stock – complete with longitudinally grooved fore-end – and the stronger metal back sight of the Statical. See Modelo 300 for details.



Modelo Expomatic

This repeating version of the Expo 200 has a magazine tube above the air cylinder, which – after the feed spring has been locked back – can be removed, loaded with diabolo pellets and replaced on the receiver. The drive spring is then reconnected to push pellets forward into the rising breechblock each time the barrel is opened. As the barrel closes, a plate behind the back sight depresses the breechblock until the pellet lies in line with the air channel. The unit operates efficiently, but velocity is lower than the standard Expo 200 owing to the breech design, and a severe penalty in the form of



Modelo Gamatic

Rarely seen outside Spain prior to the mid-1970s, this gun combines the Expomatic magazine system with the construction of the Gamo 68. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4; *cal*, 4.5/0.177; *loa*, 940/37.0; *bl*, 450/17.7; *rf*, 12R; *wt*, 2.98/6.57; *ps*, leather washer; *bs*, neoprene O-ring; *sft*, automatic; *mag*, 25-shot tube.



Modelo Gamo 68

Introduced in 1968/69, this shares many of the Expo 200 parts but has a separate pistol grip, placed well forward on the crackle-finish frame to facilitate control during shooting. The Gamo 68 was the first airgun to feature design and layout comparable to modern assault rifles. It also has an adjustable trigger. The three screws at the back of the guard are travel-, weight- and lock-screws, the first two of which (nearest the trigger) unscrew to lengthen the pull and increase the pressure respectively. The Gamo 68 has the standard Expo-type sights, a rather curious plastic butt and fore-end/pistol grip assembly, a separate butt-plate and an automatic trigger blocking safety system. The two different 'Marks' differ in stock design. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 940/37.0; *bl*, 450/17.7; *rf*, 12R; *wt*, 2.89/6.37; *ps*, leather washer; *bs*, neoprene O-ring; *sft*, automatic.



Modelo Statical

This interesting rifle incorporates an unusual recoil-suppressing system in which the air cylinder slides back on rails carried in the two-piece crackle-finish breech housing. A spring returns the parts to rest, but the system – because of the complicated recoil and spring-surge pattern – is not sufficiently advanced to eliminate jarring completely and the Statical demonstrably vibrates a little on firing. It has a wood butt with a squared cheekpiece and Monte Carlo comb, and a separate wood fore-end; it also has a strong fully-adjustable metal back sight comparable to those of many modern Mayer & Grammelspacher Original Dianas. *Type*, break-barrel semi-recoilless spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 5.5/0.22; *loa*, 1,070/42.1; *bl*, 465/18.3; *rf*, 12R; *wt*, 3.02/6.66; *pd*, synthetic or leather washer; *bs*, neoprene O-ring; *sft*, none?

EM-GE

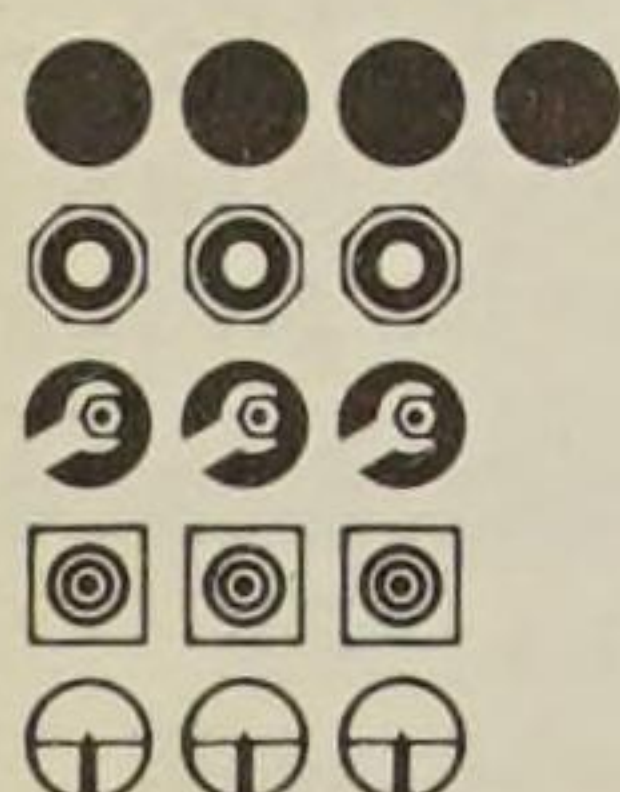
Gerstenberger & Eberwein, Em-Ge Sportgeräte KG, D-7921 Gerstetten-Gussenstadt, West Germany. UK distributors: ASI, Millard Brothers and others; US distributors: Hy-Score and others; Standard warranty: unknown.

This company is a postwar successor to the prewar Em-Ge company, Moritz & Gerstenberger of Zella-Mehlis, maker of an assortment of airguns prior to 1939 (notably the Zenit pistol). Operations recommenced in the West in the early 1950s.



Em-Ge LP3A

This is a relatively conventional good-quality barrel-cocker, popular for target and sporting use. It is long and rather heavy, the weight damping out much of the recoil sensation and spring-surge, and has a comfortable well-raked grip. The micro-adjustable back sight, at the extreme rear of the receiver, is complemented by an open blade at the muzzle. *Type*, break-barrel spring-air pistol, detent-locked (bolt?); *cl*, C3:P3; *cal*, 4.5/0.177; *loa*, 315/12.4; *bl*, 150/5.9; *rf*, 12R?; *wt*, 1.15/2.54; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.



Em-Ge LP100

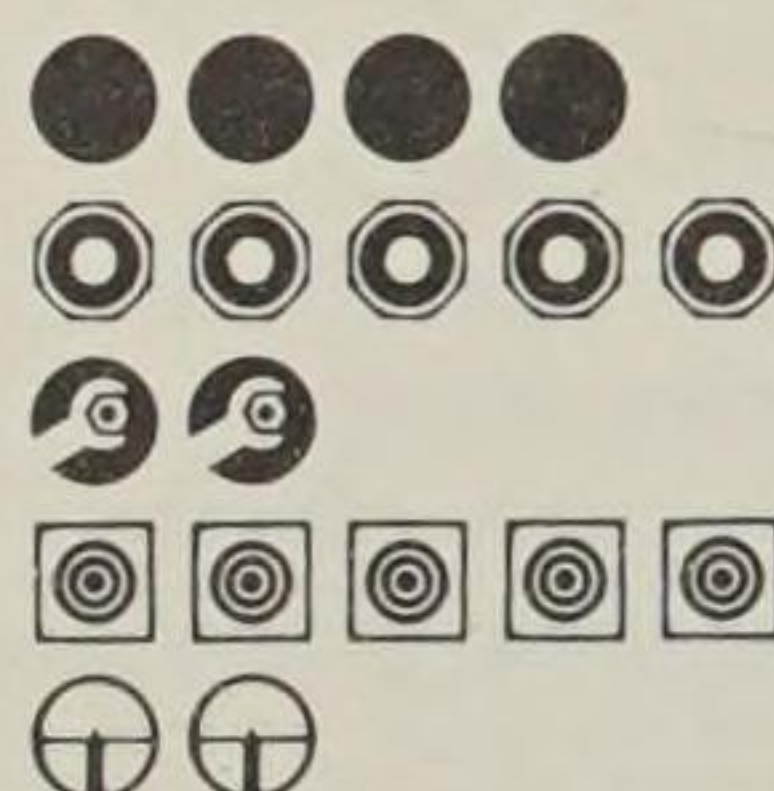
This is a modernized version of the LP3A, with cleaner lines and a large one-piece synthetic grip/frame unit. The front sight is a tunnel type, the back sight a fully adjustable open notch. The LP100 greatly resembles the Weihrauch HW70 (see page 116), but is rarely seen outside Germany. *Type*, break-barrel spring-air pistol, detent-locked (bolt?); *cl*, C3:P3; *cal*, 4.5/0.177; *loa*, 330/13.0; *bl*, 150/5.9; *rf*, 12R?; *wt*, 1.20/2.65; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

FEINWERKBAU

Feinwerkbau Westinger & Altenburger KG, D-7238 Oberndorf/Neckar, Neckarstrasse 43, West Germany. UK distributor: ASI; US distributor: formerly Daisy, now Beeman's Precision Airguns; Standard warranty: 24 months (piston spring and breech seal only).

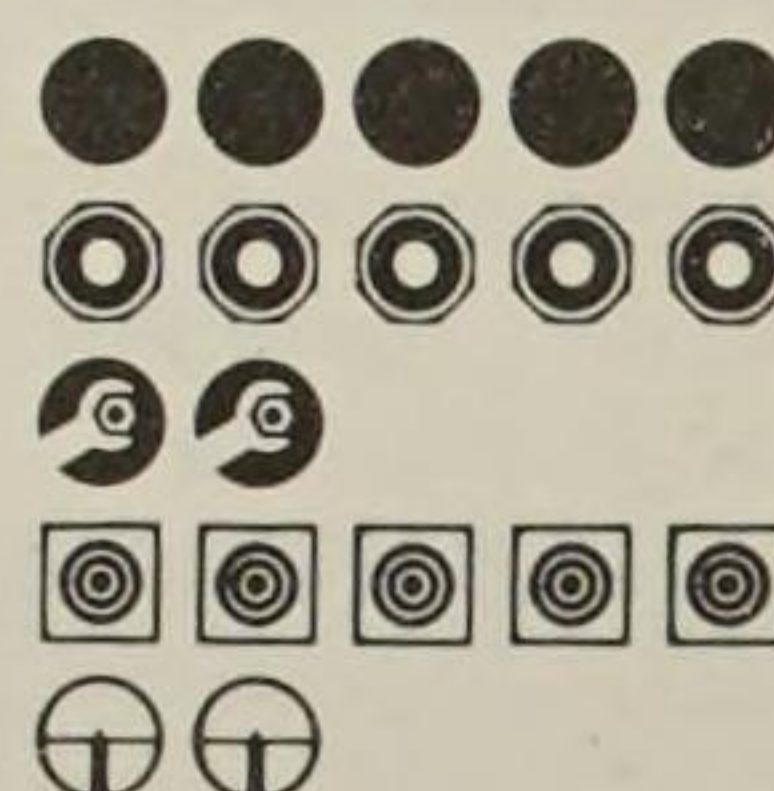
Feinwerkbau is a relatively newly established manufacturer, entering its local commercial register in April 1949. Its principal contribution to airgun technology has been the development to near perfection of a recoilless system developed by Karl Westinger, Ernst Altenburger and Edwin Wöhrstein (DE PS 1,140,489, sought in February 1961), which is incorporated in all Feinwerkbau airguns apart from the 120 series. The mechanism — in which the barrel and air cylinder slide back on rails in the stock — has been extremely successful.

It won virtually every major competition and held all the world and European records for some time until challenged in the mid-1970s by the Walther LGR, whose single-stroke pneumatic system is a complete contrast to the complex elegant precision of the Feinwerkbau.



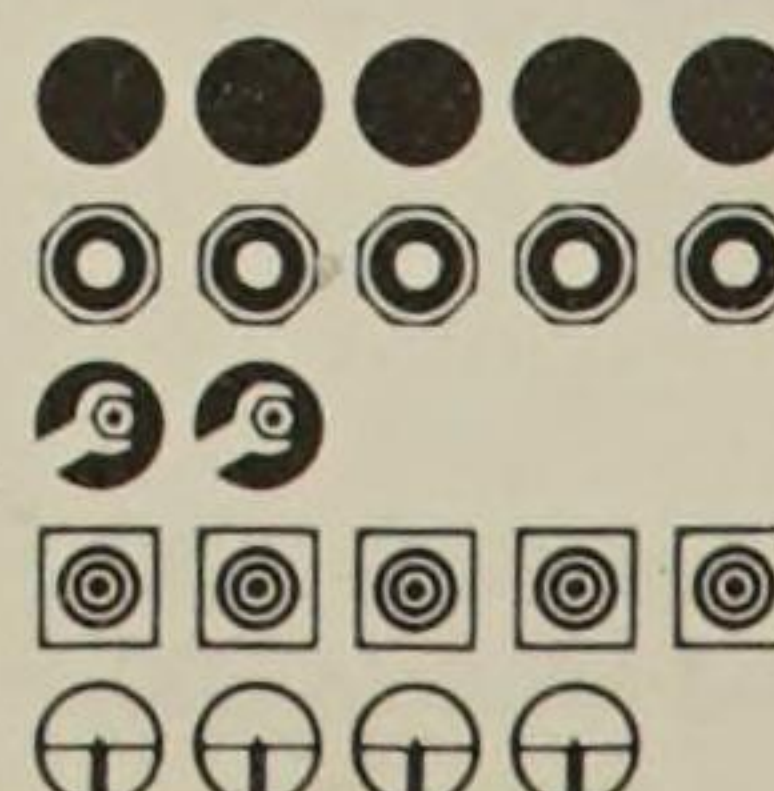
Modell 300S (or 300S Match)

This is an improved version of the 300, the revisions being largely cosmetic. The stock has a stippled pistol grip, a deep squared fore-end with an oblique-cut tip, and a vertically adjustable rubber butt-plate. The short cocking lever lies on the right side of the breech, which is a direct-loading type, and there are full match-quality aperture sights; the back sight locks into one of four transverse slots cut across the air cylinder. There is also an integral barrel weight and a fully adjustable trigger, with a lateral adjustment absent from earlier guns. The outstandingly efficient recoil-eliminating system gives virtually no vibration or movement on firing. *Type*, fixed-barrel sidelever-cocking recoilless spring-air rifle; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,100/43.3; *bl*, 505/19.9; *rf*, 12R; *wt*, 4.87/10.74; *ps*, steel ring; *bs*, synthetic O-ring; *sft*, automatic.



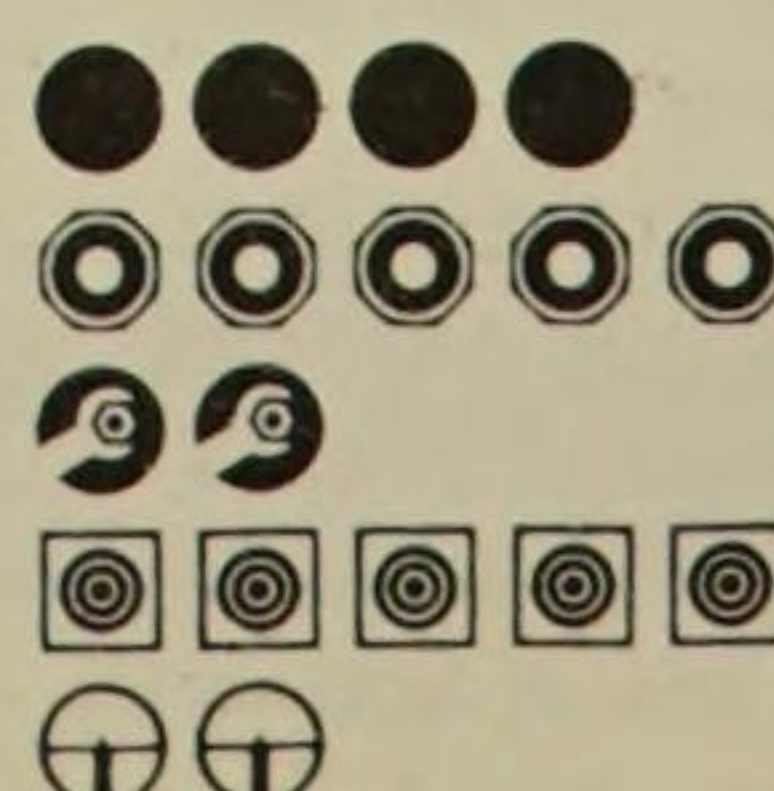
Modell 300S Junior

This gun is a smaller and lighter 300S Match, with a short reduced-depth fore-end and a short barrel lacking the muzzle weight. *Type*, fixed-barrel sidelever-cocking recoilless spring-air rifle; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,015/40.0; *bl*, 435/17.1; *rf*, 12R; *wt*, 4.00/8.82; *ps*, steel ring; *bs*, synthetic O-ring; *sft*, automatic.



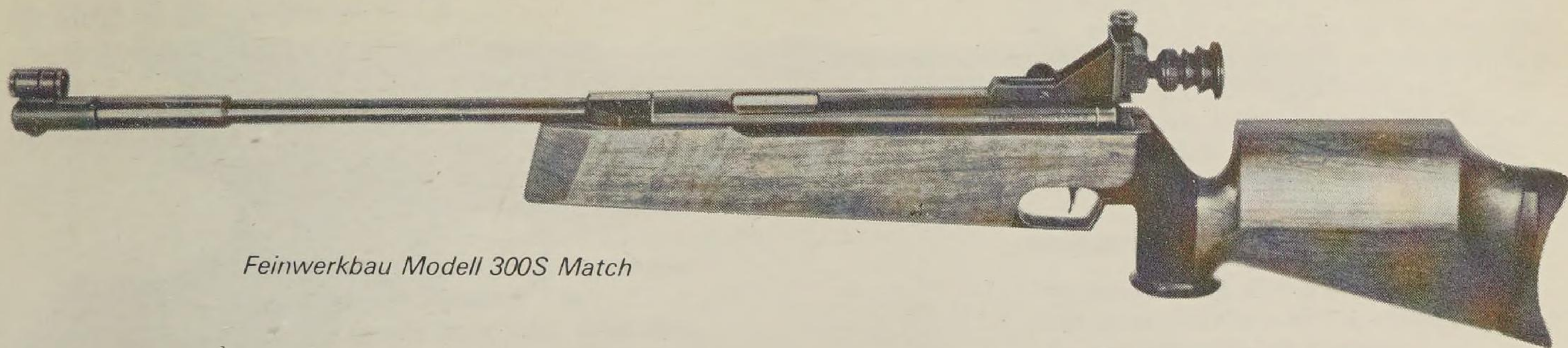
Modell 300S Laufende Scheibe (or 300S LS)

This is intended for moving-target shooting. One version has a virtually standard stock and fixed high cheekpiece; another has a similar stock with a screw-elevated variable-height cheekpiece; and the third has a rather inelegant thumbhole stock (Lochschaft). All three have telescope sights (usually the Bushnell Scopechief), a broad or beaver-tail fore-end, a distinctive adjustable butt-plate and a barrel weight without provision for a front sight. There is also a special direct-action trigger, protected by DE PS 2,518,146. See Modell 300S for details.

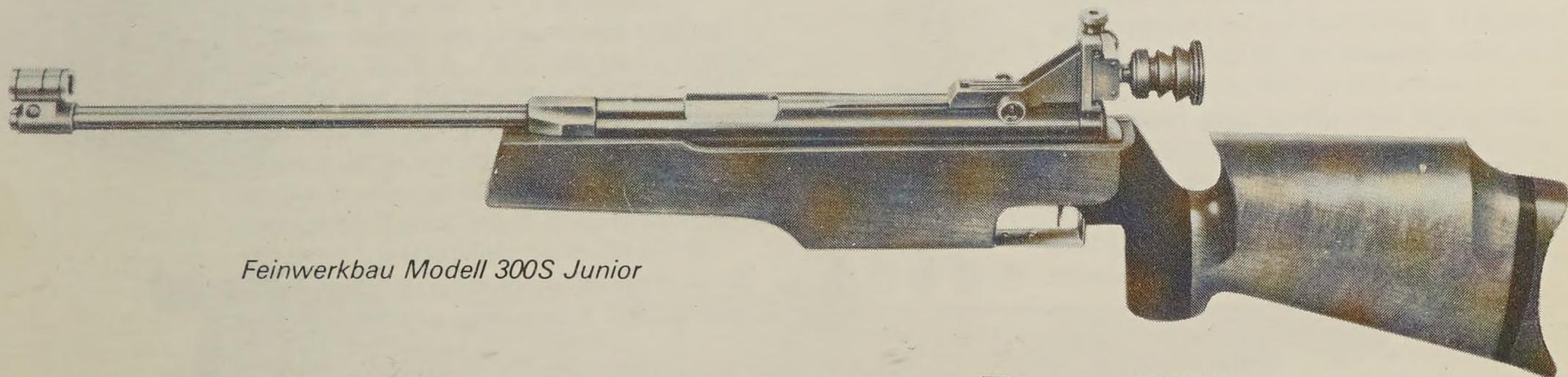


Modell 300S Match L

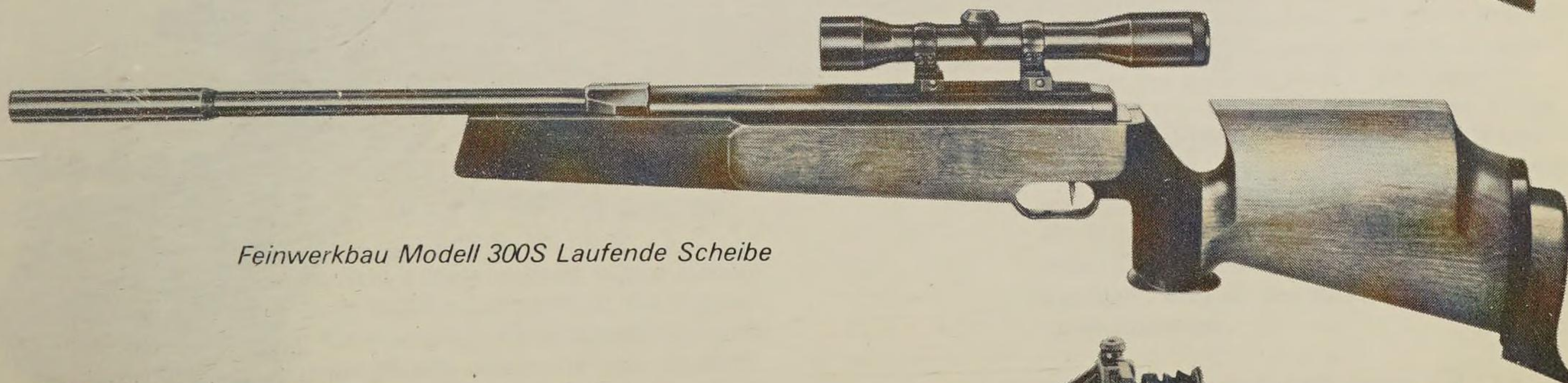
The 'L' version is stocked similarly to the 300S Universal, but lacks the removable cheekpiece. Its distinguishing feature is the straight fore-end under-edge, which complements that of the Feinwerkbau 2000 UIT Standard cartridge rifle. See Modell 300S for details.



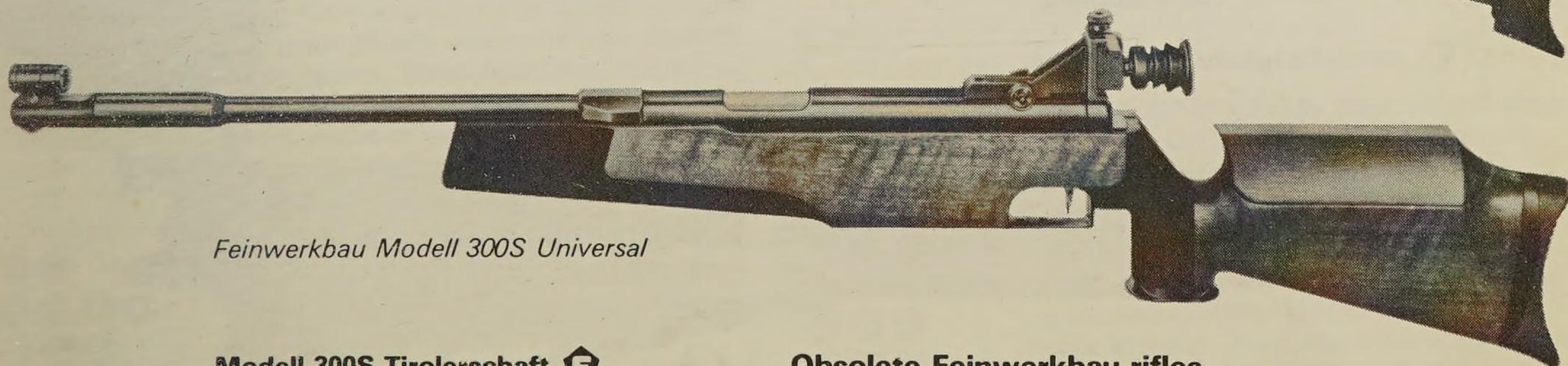
Feinwerkbau Modell 300S Match



Feinwerkbau Modell 300S Junior



Feinwerkbau Modell 300S Laufende Scheibe



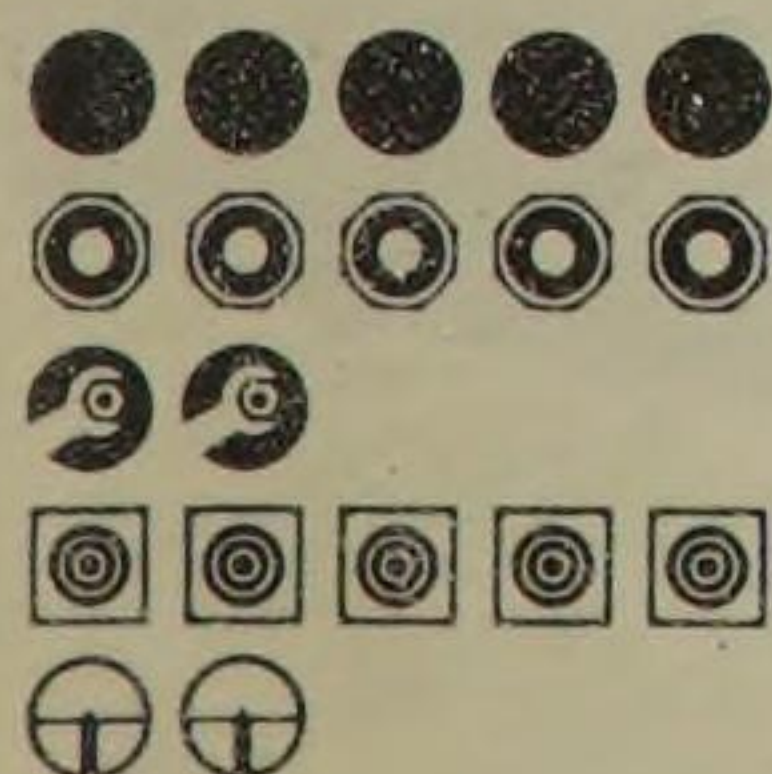
Feinwerkbau Modell 300S Universal

Modell 300S Tirolerschaft

The Tyrolean-stock version of the 300S, with its distinctive high comb and concave cheekpiece, was discontinued in 1978. See Modell 300S for details.

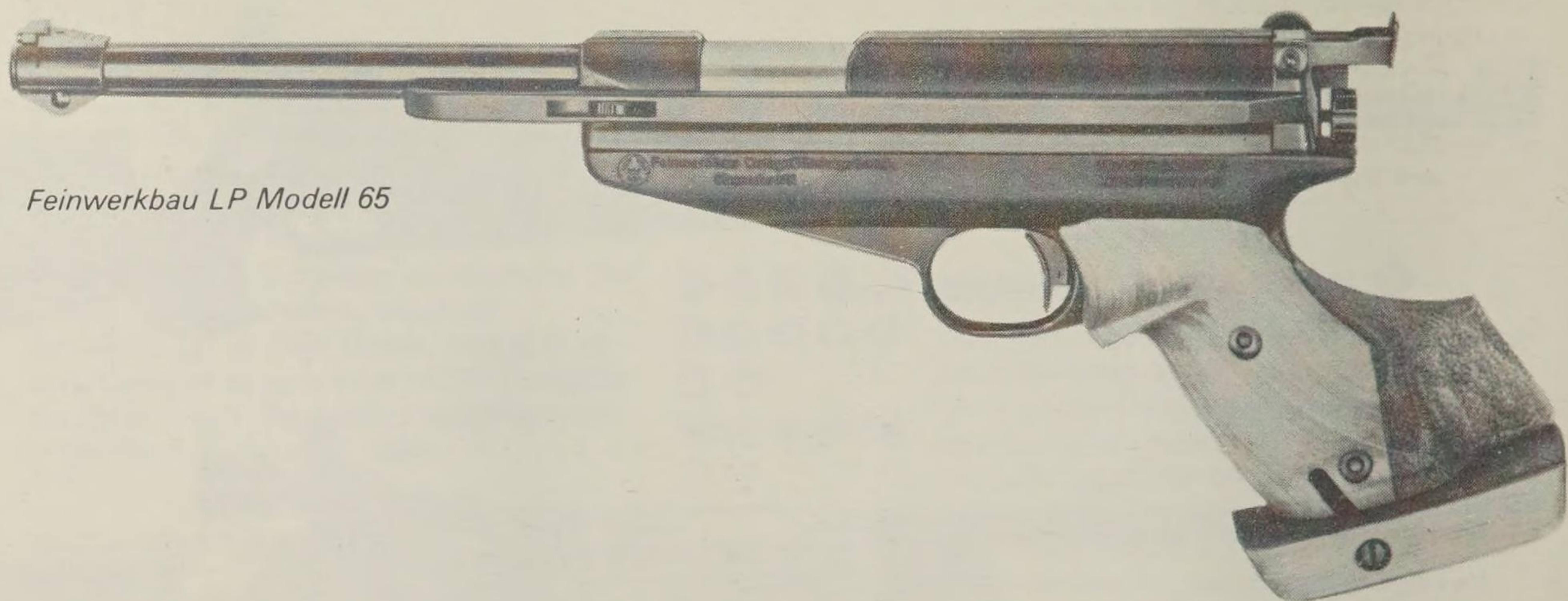
Modell 300S Universal (or 300SU)

This derivative of the 300S Match has a very distinctively shaped stippled fore-end and a squared pistol grip and trigger guard. Its principal distinguishing characteristic, however, is its removable cheekpiece. The NV version (niedere Visierung) gives a low sight line with a low cheekpiece; HV (hohere Visierung) has a high sight line resulting from a high cheekpiece and sight-raising blocks. A telescope-sighted version, lacking the front sight, may also be obtained. See Modell 300S for details.

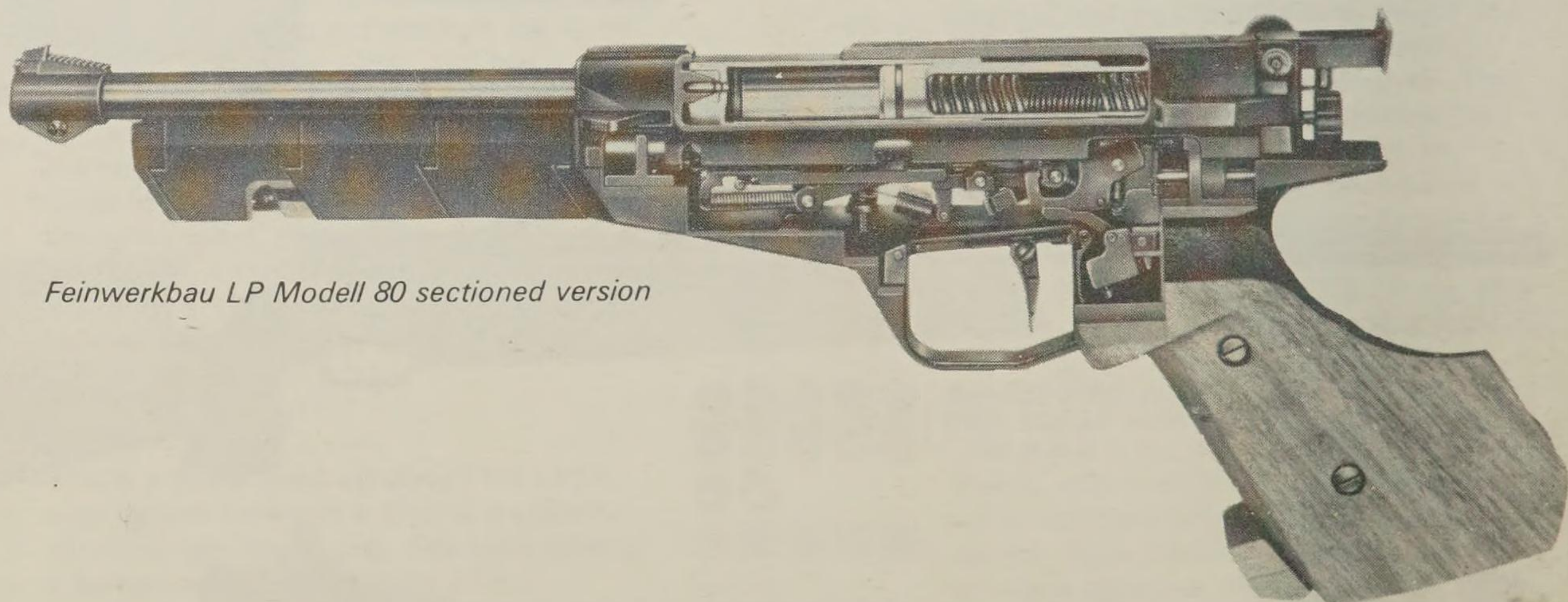


Obsolete Feinwerkbau rifles

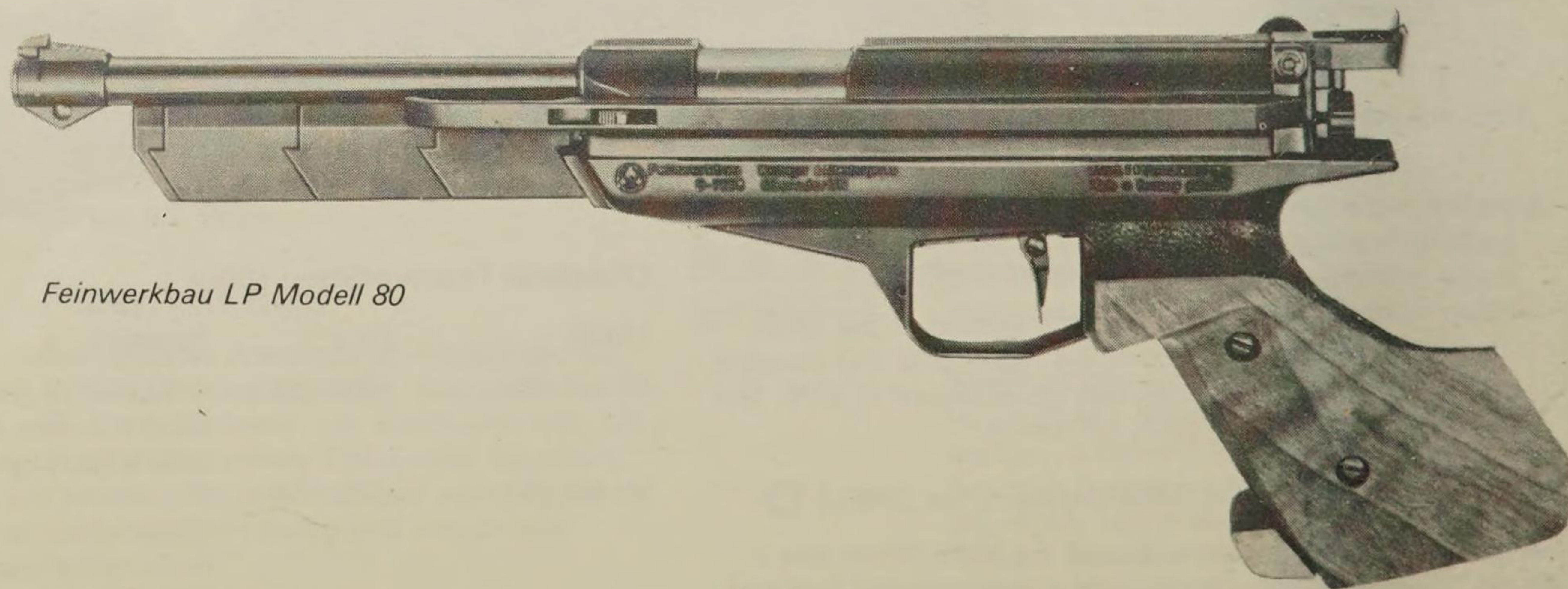
Model	Date	Remarks
Modell 100	1963 – 68	A version of the 150, made in small numbers for sporting use. It had slight recoil effect.
Modell 150	1963 – 38	The first of the recoilless target rifles, very similar to those being made in the 1980s but with a simpler trigger; <i>loa</i> 1,065/41.9; <i>bl</i> 510/20.1; <i>rf</i> 12R; <i>wt</i> 4.31/9.50.
Modell 200	1969 – 72	A version of the 300 with slight recoil effect.
Modell 300	1969 – 72	A minor improvement of the 150, with a different trigger system and other refinements. Also known as the Modell 300 Standard. Newer guns have a squared stock similar to the 300S Match. A Tyrolean-stock version was available prior to 1978.



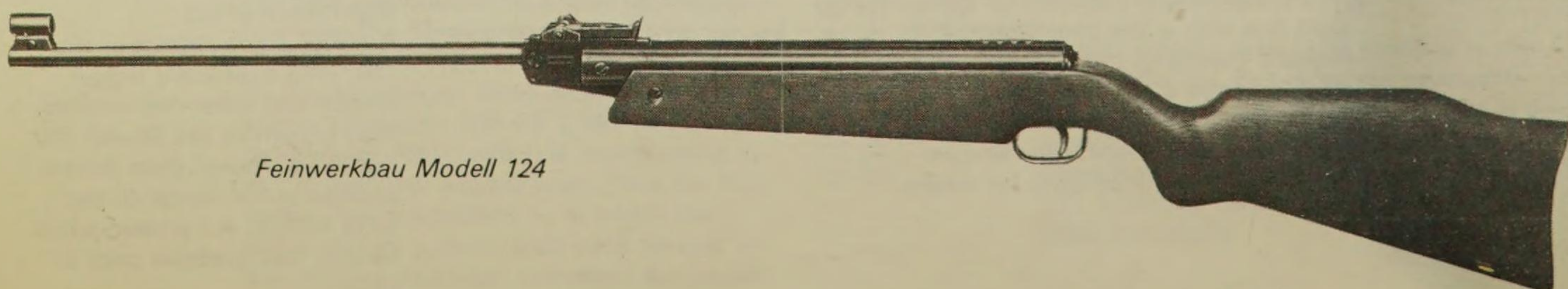
Feinwerkbau LP Modell 65



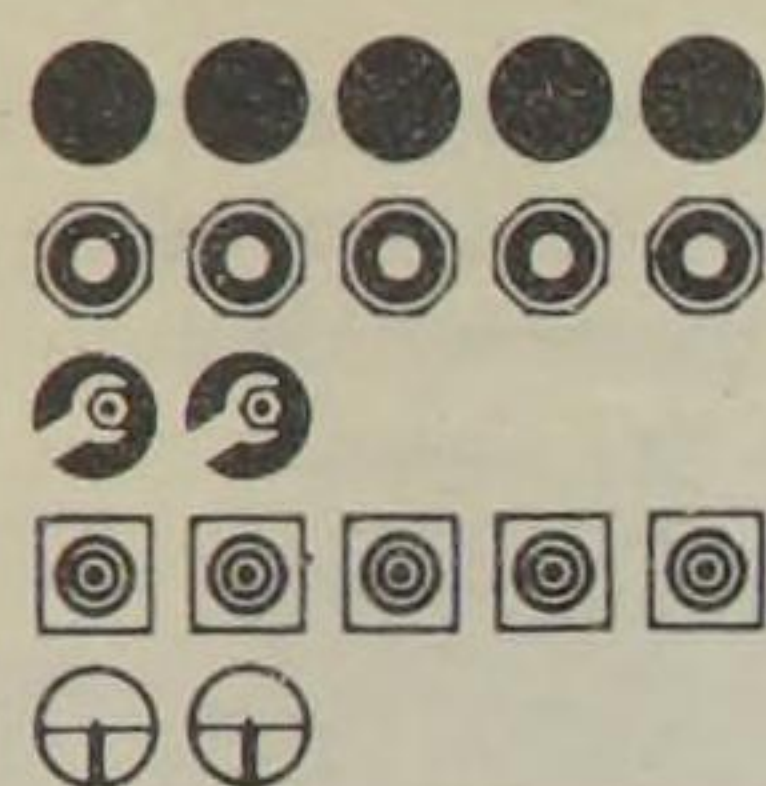
Feinwerkbau LP Modell 80 sectioned version



Feinwerkbau LP Modell 80

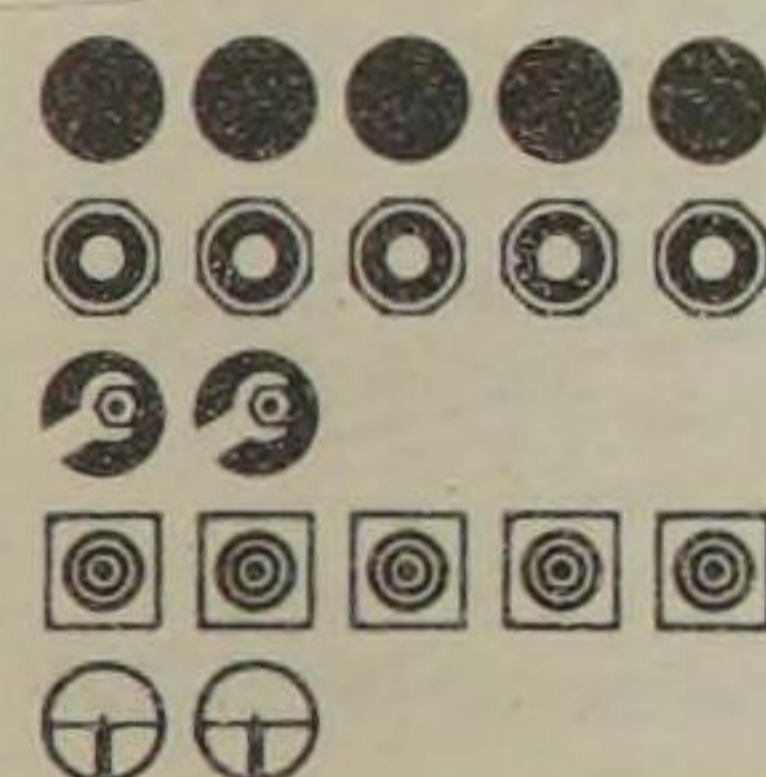


Feinwerkbau Modell 124



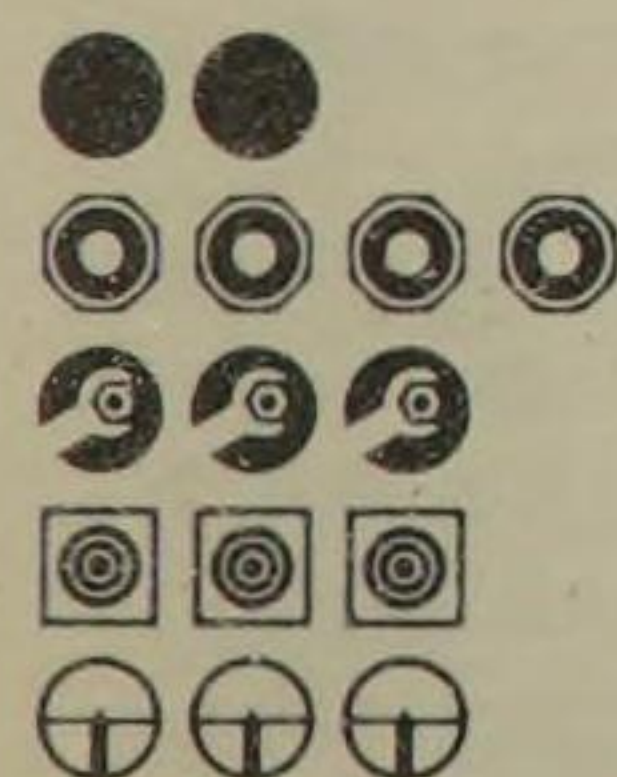
LP Modell 65

The Feinwerkbau pistol has been as successful as the company's rifles whose action it shares, though the cocking lever, operated by the non-trigger hand, lies on the left side of the receiver. The top-quality micro-adjustable back sight (protected by DE PS 1,181,590, sought in 1962) lies at the extreme rear and may be fitted with a variety of sight-notches. The interchangeable front sight, adjustable sighting aperture and the adjustable auxiliary weight are all patented features (DE PS 1,703,910, 1,578,289 and 1,428,621 respectively). The thumb-rest grips may be plastic or walnut, though walnut palm-rest types may be obtained for either hand. The trigger is adjustable down to 500gm (1.1lb) though an alternative, 1.36kg (3lb), may be obtained for simulated cartridge-pistol training; in this rôle, the recoil-eliminating system can be disconnected. *Type*, fixed-barrel sidelever-cocking recoilless spring-air pistol; *cl*, C1; *cal*, 4.5/0.177; *loa*, 389/15.3 with standard grip; *bl*, 190/7.5; *rf*, 12R; *wt*, 1.18/2.60 without weights; *ps*, steel ring; *bs*, synthetic O-ring; *sft*, automatic.



LP Modell 80

This improvement of the LP65 lacks the cartridge-simulating facility, but incorporates a much-refined trigger system and other detail modifications; the trigger lever, for example, can be adjusted laterally and longitudinally within the new squared trigger guard. Three distinctive weights – 15, 60 and 85gm – may be fitted under the barrel, superseding the obsolete LP65 barrel sleeve. The grips may be standard or palm-rest type. See LP Modell 65 for details.



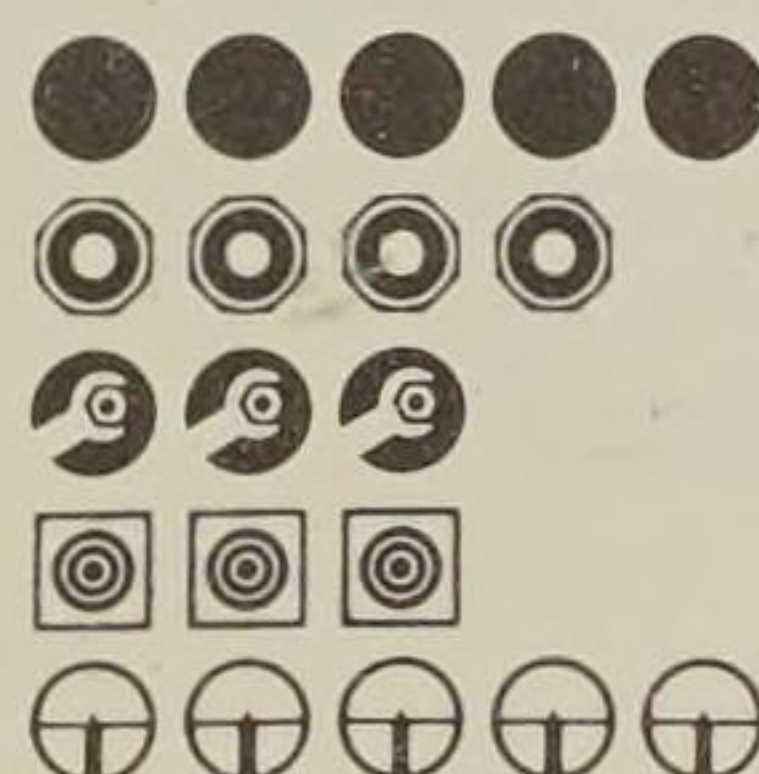
Modell 121 Sport

This well made if conventional barrel-cocker features a well designed lever-system ensuring an easy cocking stroke. There is a simple two-stage trigger, adjustable only for travel, and a semi-automatic safety protruding from the back of the air cylinder: this must be reset manually before each shot. The sights consist of a hooded blade and a clever slider; the standard aperture or telescope sights can also be fitted, however. The stock has a plain rounded pistol grip, a low Monte Carlo comb and,

surprisingly, no butt-plate. Power is quite low, as the 121 is intended for the German market. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R3/R4; *cal*, 4.5/0.177; *loa*, 1,095/43.1; *bl*, 465/18.3; *rf*, 12R; *wt*, 3.05/6.72; *ps*, synthetic washer; *bs*, synthetic O-ring; *sft*, semi-automatic.

Modell 121 Luxusausführung

The deluxe stock of this gun displays a chequered pistol grip with a spacer and cap, a cheekpiece and a spacer-accompanied rubber butt-plate. The effect is rather spoiled by the stamped-strip trigger guard, which is often replaced on customized guns by the cast Weihrauch pattern. Sling swivels lie under the barrel block and the butt. See Modell 121 Sport for details.

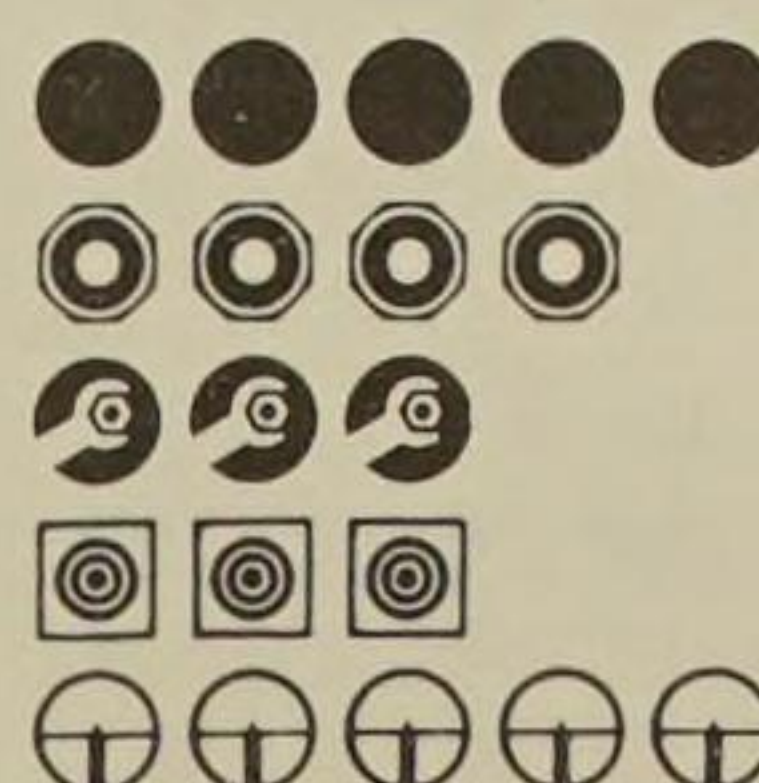


Modell 124

This popular sporting gun, mechanically identical with the 121 but developing increased 'export' power, will often exceed 800fs (245ms) with certain brands of pellet though the cocking stroke only takes an effort of 17 – 19lb, roughly half that of the comparably powerful HW35. The 124 has the standard plain stock. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R1/R2; *cal*, 4.5/0.177; *loa*, 1,095/43.1; *bl*, 465/18.3; *rf*, 12R; *wt*, 3.05/6.72; *ps*, synthetic washer; *bs*, synthetic O-ring; *sft*, semi-automatic.

Modell 124 Luxusausführung

The deluxe 124 features the improved stock of the 121 Luxusausführung. See Modell 124 for details.

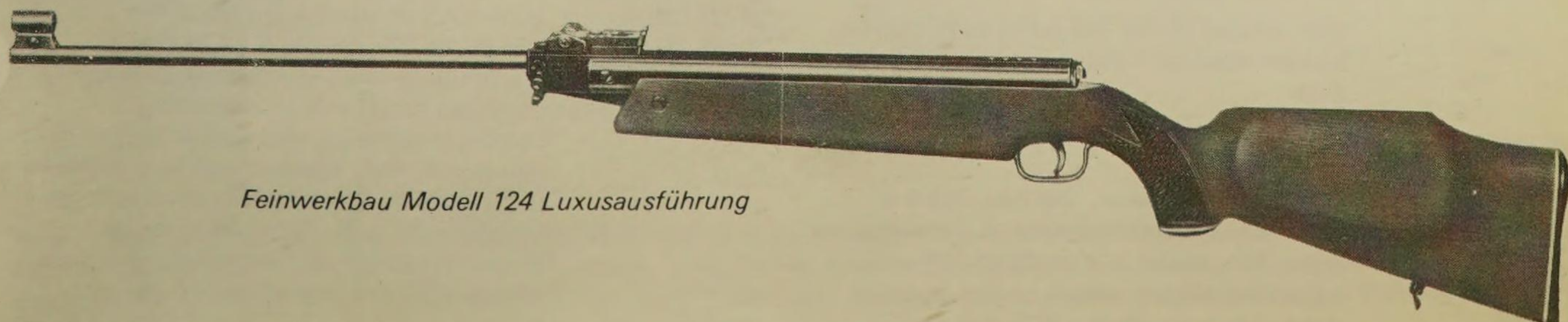


Modell 127

A larger-calibre version of the 124, capable of exceeding 600fs (185ms) with some types of pellet. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R1/R2; *cal*, 5.5/0.22; *loa*, 1,095/43.1; *bl*, 465/18.3; *rf*, 12R; *wt*, 3.05/6.72; *ps*, synthetic washer; *bs*, synthetic O-ring; *sft*, semi-automatic.

Modell 127 Luxusausführung

The deluxe version of the 127. See Modell 127 for details.



Feinwerkbau Modell 124 Luxusausführung

HAENEL (THÄLMANN)

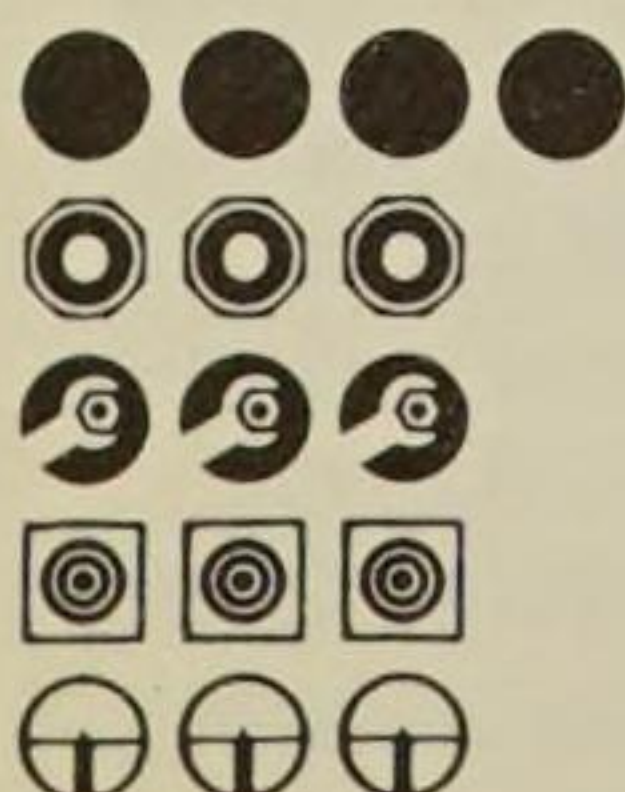
VEB Fahrzeug- und Jagdwaffenfabrik Ernst Thälmann, DDR-60 Suhl, Meiningen Strasse 222. Exporter: Exportkontor Suhler Jagdwaffen, DDR-60 Suhl, Wilhelm-Pieck-Strasse 16; UK distributor: Viking Arms Ltd.; US distributor: none; Standard warranty: unknown.

Haenel's is a well-established name in airgun circles owing to the extensive range of airguns made between the wars, including a number of barrel-cockers and the 'Sportmodell' of 1933, designed by Hugo Schmeisser. Production resumed after the end of the Second World War and Haenel became part of the nationalized East German firearms industry. The Sportmodell was put back into production as the Modell 49 and various other designs appeared, though their chronology remains obscure. The modern Haenels are among the best products from the Eastern bloc, the 311, in particular, having many champions.



LG 300-7

This is a standard, youth's gun, with a well finished beechwood stock but otherwise unremarkable. However, it displays a sliding thumb-operated safety catch protruding from the back of the air cylinder; applied when the barrel is opened, the catch must be reset manually before each shot. The back sight has a slider-controlled elevating system, though lateral adjustments are effected by a conventional drum. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4/R5; *cal*, 4.5/0.177; *loa*, 980/38.6; *bl*, 400/15.7; *rf*, 12R?; *wt*, 2.10/4.63; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, semi-automatic.

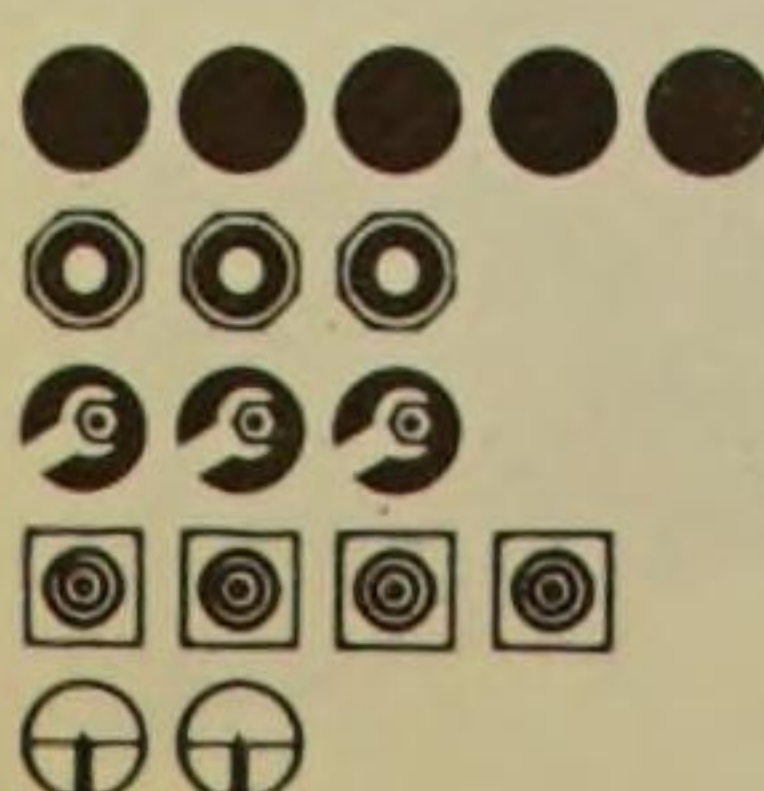


LG 303-5

Basically an enlargement of the 300-7, but with an adult-size stock, greater power and an adjustable-travel double-pressure trigger. The 303-5 has the same back sight as the smaller gun, but its front sight is a hooded rather than open blade. *Type*, break-barrel spring-air rifle, positively-locked (bolt); *cl*, R3; *cal*, 4.5/0.177; *loa*, 1,075/42.3; *bl*, approximately 450/17.7; *rf*, 12R?; *wt*, 2.92/6.44; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, semi-automatic.

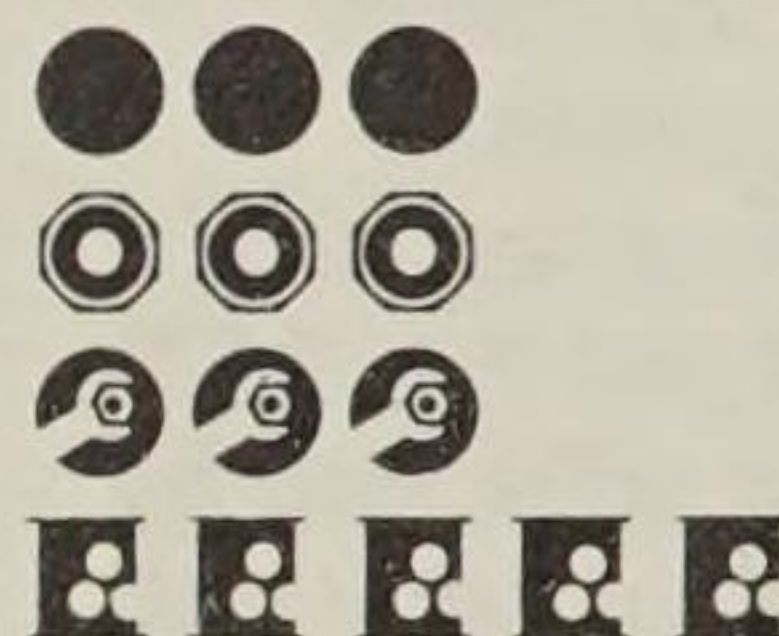
LG 303-6

This version of the 303-5 has sling swivels and an adjustable sling. See LG 303-5 for data.



LG 303-8-S

Although rarely seen, the new 303-8-S promises reasonable quality at a competitive price. This model is a modified 303 with an adjustable trigger, match quality aperture sights (shared with the 311) and a

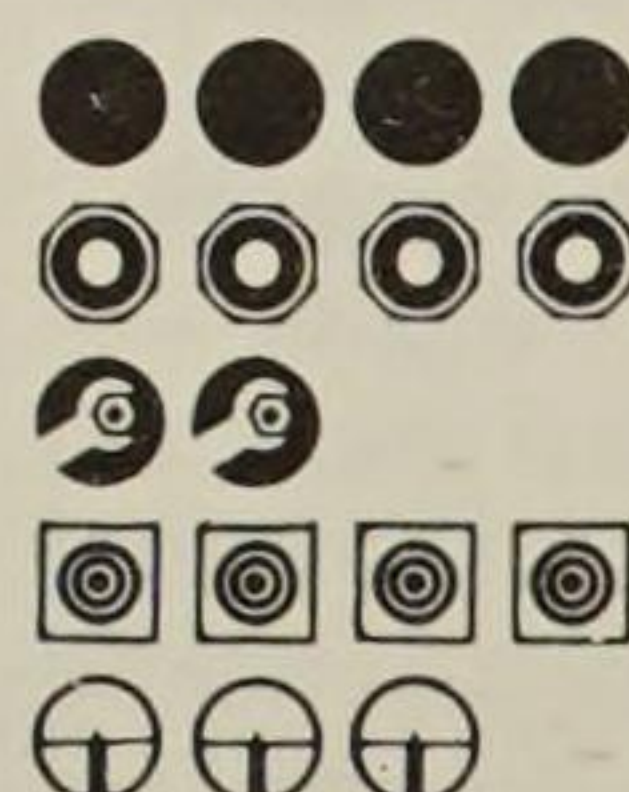


LG 310-8

This modern 'Sportmodell', rarely seen outside the GDR, is very similar to the rather better quality Anschütz LG275 (see page 33). The 310-8 lacks the double Anschütz safety devices – featuring instead the standard semi-automatic Haenel pattern – but has a better, fully adjustable, tangent-leaf back sight. The guns chamber the Rundkugeln Nr.9 with which, at short range, they are quite accurate. *Type*, fixed-barrel bolt-action spring-air rifle; *cl*, R5; *cal*, 4.40/0.173 (ball); *loa*, 1,065/41.9; *bl*, 420/16.5; *rf*, 12R?; *wt*, 2.70/5.95; *ps*, leather washer; *sft*, semi-automatic; *mag*, 6-, 8- or 12-shot detachable box.

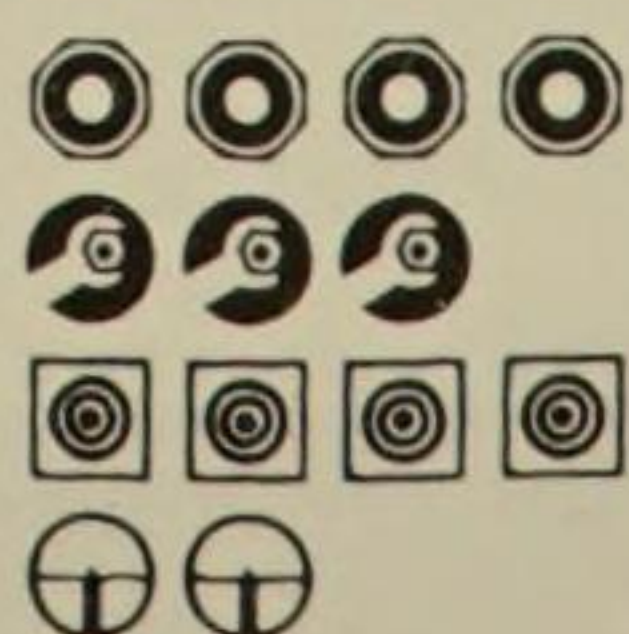
LG 310-9

An LG 310-8 fitted with sling swivels and an adjustable-length sling. See LG 310-8 for data.



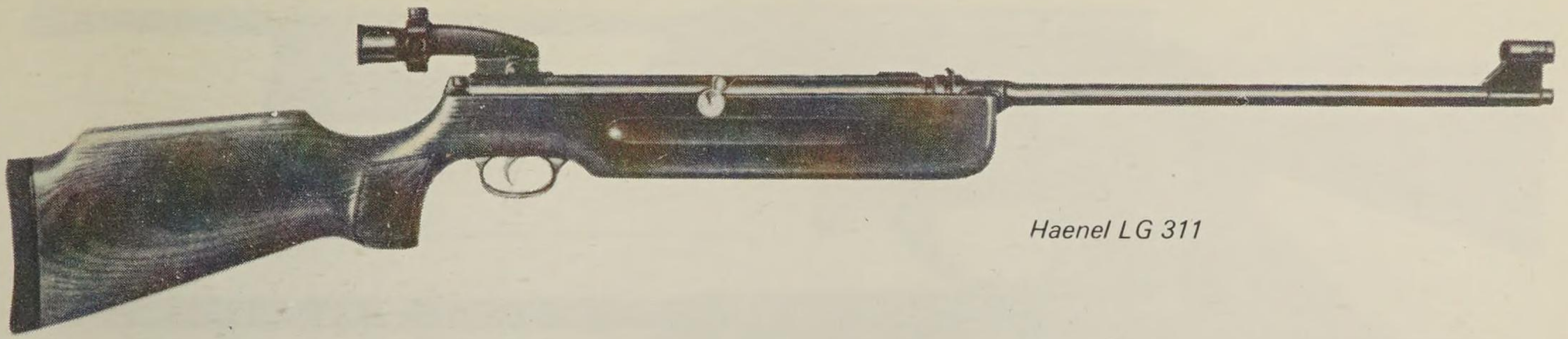
LG 311

The popular – if rarely available – 311, discontinued in 1979, was the only first-class bolt-action target rifle. It shares much of the 310 mechanism, but has a multi-lever match quality trigger unit and a rotary loading plug controlled by a lever on the left side of the receiver. There is a very distinctive aperture back sight, a replaceable-element tunnel front sight and a competition-style stock with a fixed rubber butt-plate. A micro-adjustable open notch sight, which fitted the rail immediately behind the loading port, could be obtained to special order. *Type*, fixed-barrel bolt-action spring-air rifle loaded through a rotary plug; *cl*, M2; *cal*, 4.5/0.177; *loa*, 1,110/43.7; *bl*, 420/16.5; *rf*, 12R?; *wt*, 3.50/7.72; *ps*, leather washer; *sft*, semi-automatic.



Meisterschafts LG 3.121

Made only in small numbers in the mid-1970s, the obsolete 3.121 was a conventional-looking sidelever-cocking recoilless target rifle incorporating a combination spring and rubber buffer. It had match-style aperture sights, a sidelever locking catch and a system of spacers to lengthen the butt. *Type*, fixed-barrel sidelever-cocking semi-recoilless spring-air rifle, loaded through a rotary plug; *cl*, M1/M2; *cal*, 4.5/0.177; *loa*, 1,075/42.3; *bl*,



Haenel LG 311

approximately 480/18.9; *rf*, 12R; *wt*, 4.90/10.80; *ps*, leather washer?; *bs*, synthetic; *sft*, automatic.

Meisterschafts LG 550

A new competition rifle with toplever-cocking, as yet unseen. Details unknown.

HÄMMERLI

Hämmerli Jagd- und Sportwaffenfabrik AG, CH-5600 Lenzburg, Switzerland; D-7890 Waldshut-Tiengen 2 (Hochrhein), West Germany. UK distributor: (Tiengen-made airguns) Norman May & Co.; US distributor: Hy-Score Arms Co.; Standard warranty: 12 months.

This manufacturer of high-grade target guns was founded by Johann Ulrich Hämmerli in 1863. Control passed from the family in 1946 and, ultimately, in 1971, to Schweizerische Industrie-Gesellschaft (SIG) of Neuhausen/Rheinfalls. Air- and gas-powered guns designed by Jacques Bertschinger, Hugo Kehl and Hans-Joachim Kaltmann, made in the Hämmerli GmbH factory in Tiengen, have been marketed since the late 1950s. Claims that the guns are made 'by a subcontractor' are, therefore, inaccurate, though the modern airguns do not have the high quality associated with the company's cartridge-firing types. Production is now confined to the 400 series, as the production line for the CO₂ Single and Master pistols was destroyed by fire in 1977.

Obsolete and discontinued Hämmerli gas-powered designs

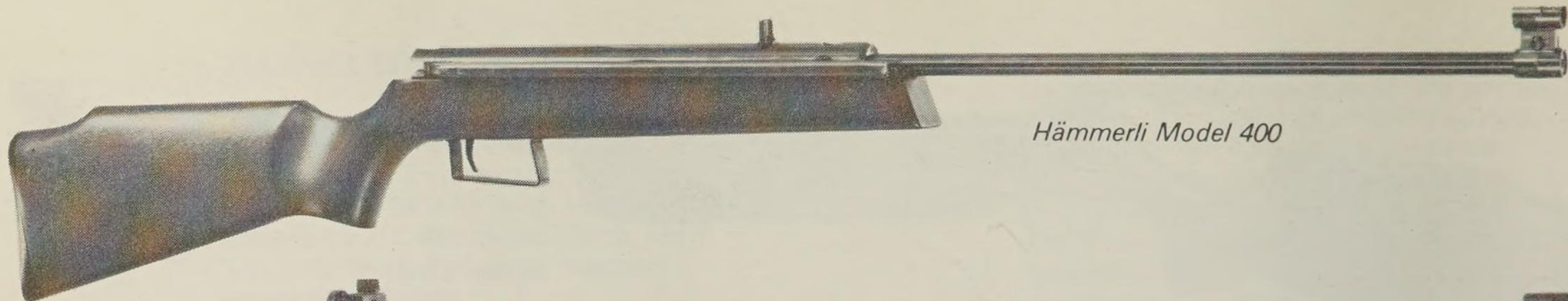
Model	Sparkler R and RD	Single	Match	Junior	Master	Cadet	Rapid	Duell	Prinz	Match	Cadet Mehrlader
Type	pistol	pistol	rifle	rifle	pistol	rifle	pistol	pistol	pistol	rifle	rifle
Power source	cartridge	cartridge	cartridge	cartridge	cartridge	cartridge	reservoir/ cartridge	cartridge	cartridge	remote cylinder	cartridge
Calibre	4.5mm	4.5mm	4.5mm	4.5mm	4.5mm	4.5mm	4.5mm	4.5mm	4.5mm	4.5mm	4.5mm
Ammunition	BB ¹	diabolo	diabolo	diabolo	diabolo	diabolo	BB	diabolo	diabolo	diabolo	BB
Magazine action	manual	—	—	—	—	—	semi- automatic	manual	manual	—	manual
capacity	5	—	—	—	—	—	5	5	5	—	80
ammunition	BB	—	—	—	—	—	BB	diabolo	diabolo	—	BB
Date	1958–61	1961–78	1962–70	1962–70	1964–78	1965–69	1966–69	1967–70	1967–70	1967	1968–69

¹Sparkler RD can also fire diabolo pellets.

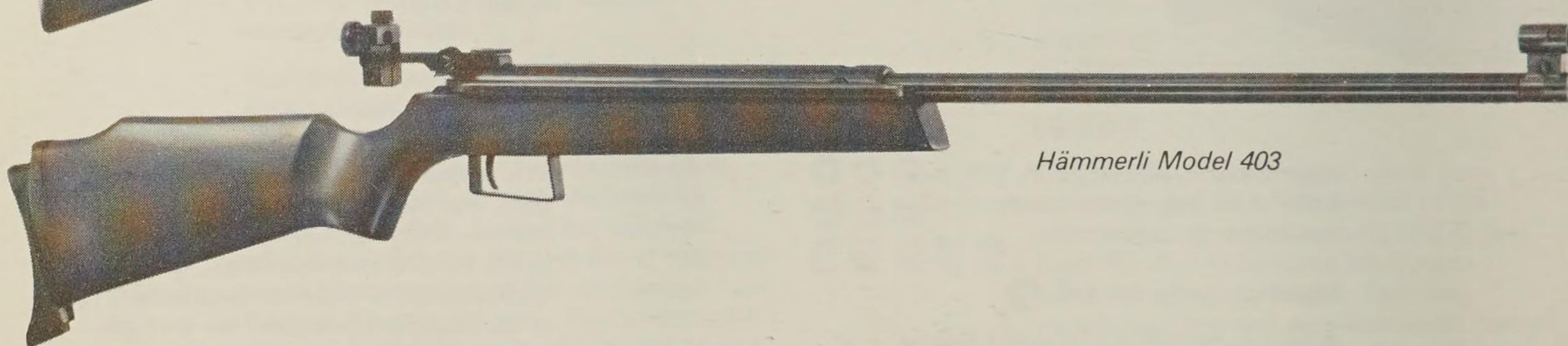
Obsolete and discontinued Hämmerli spring-air designs

Model	M1	M2	M3	M4	M10
Old designation	Puma M494	Puma M495	Puma M496	Puma M490	Puma M497
Calibre	4.5mm	4.5mm	4.5mm	4.5mm	4.5mm
Distinguishing features	fixed sights	adjustable open-notch back sight, tunnel-type front sight	as M494, with additional under-barrel weight bar	as M495, with the bar of the M496	version of M494 with micro-adjustable target-type aperture sights, and a separate adjustable butt-plate

Note. These guns, developed in the early 1970s, exhibited an earlier version of the 400-series sidelever-action. This had a simple lever-locking catch – a reversed V-string and ball assembly – but lacked a sidelever safety and was potentially dangerous; as a result, the improved 400 series was speedily substituted. The name 'Puma' was dropped after complaints by Lauterjung & Sohn of Solingen, makers of Puma knives, and a new designation was adopted in about 1974.



Hämmerli Model 400



Hämmerli Model 403



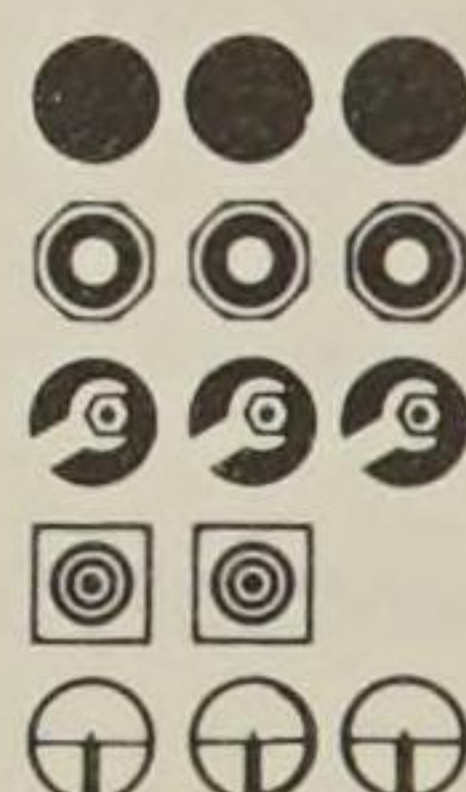
Load



Fire

Model 400

The 400 series has an automatic safety, preventing the lever snapping shut during cocking, and the standard drum-pattern loading port of the original Puma rifles. This may be rotated to 'load' or 'fire' positions, according to the arrowhead on the drum-knob. The barrel is beautifully rifled, the good trigger system gives a crisp pull, and the sights comprise a replaceable-element tunnel and a fixed open notch. Surprisingly, a sidelever-locking catch is absent and the lever itself is a rather sharp-edged pressing. The lines of the extremely well made stock and the large squared trigger guard are a little plain for such a large gun. *Type*, fixed-barrel sidelever-cocking spring-air rifle, loaded through a rotary plug; *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,125/44.3; *bl*, 485/19.1; *rf*, 12R; *wt*, 3.40/7.50; *s*, leather washer; *sft*, automatic and manual.



4.5/0.177; *loa*, 1,140/44.9; *bl*, 485/19.1; *rf*, 12R; *wt*, 4.20/9.26; *ps*, leather washer; *sft*, automatic and manual.

Model 420

This is simply a Model 400 action in a greenish-colour military-style ABS stock featuring a separate pistol grip and a dummy magazine. The Hämmerli stock – unlike that of the comparable but much more powerful Sussex Armoury Jackal Hi-Power – exhibits a marked drop at the comb. Like the remainder of the 400 series, the 420 is not especially powerful, but, despite its rather small diameter bore, it is extremely accurate with the right brands of pellets. The 420 was preceded by a similar gun, with a very different magazine shape. This was known during its brief life as the Model 42A. Details are generally as those for Model 400.



Model 401

This variation of the M400 features an improved micro-adjustable open notch back sight, which lies immediately behind the loading port. See Model 400 for details.



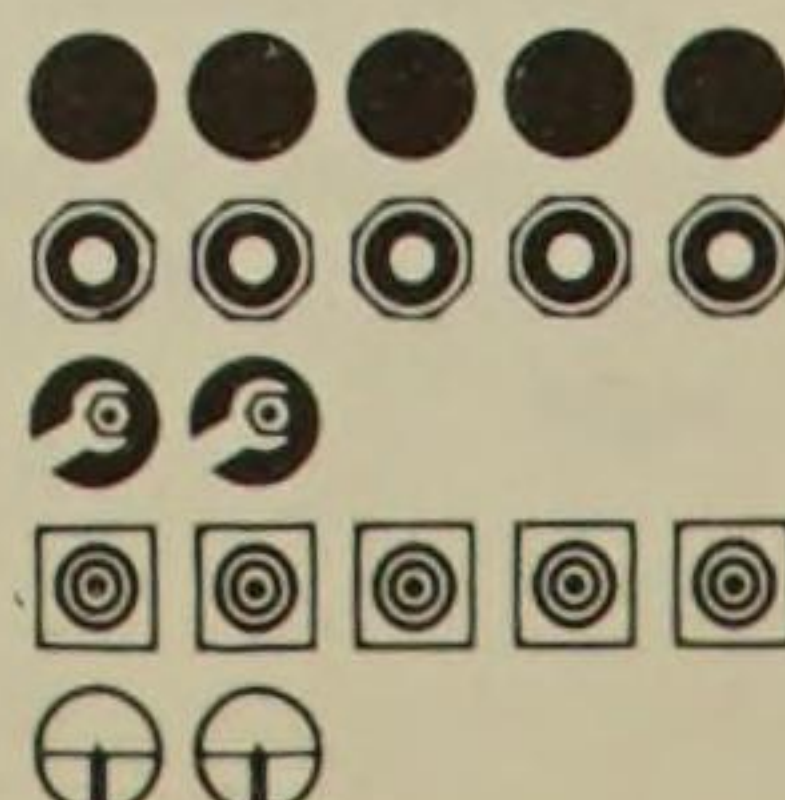
Model 402

The M402 is mechanically identical with the 400, but lacks iron sights. A telescope sight is fitted instead. See Model 400 for details.



Model 403

The target-shooting version of the standard design has an additional barrel-sleeve weight, a vertically adjustable rubber butt-plate and a match-grade aperture back sight which is identical, in fact, to the standard Weihrauch design. *Type*, fixed-barrel sidelever-cocking spring-air rifle, loaded through a rotary plug; *cl*, M2/M3; *cal*,



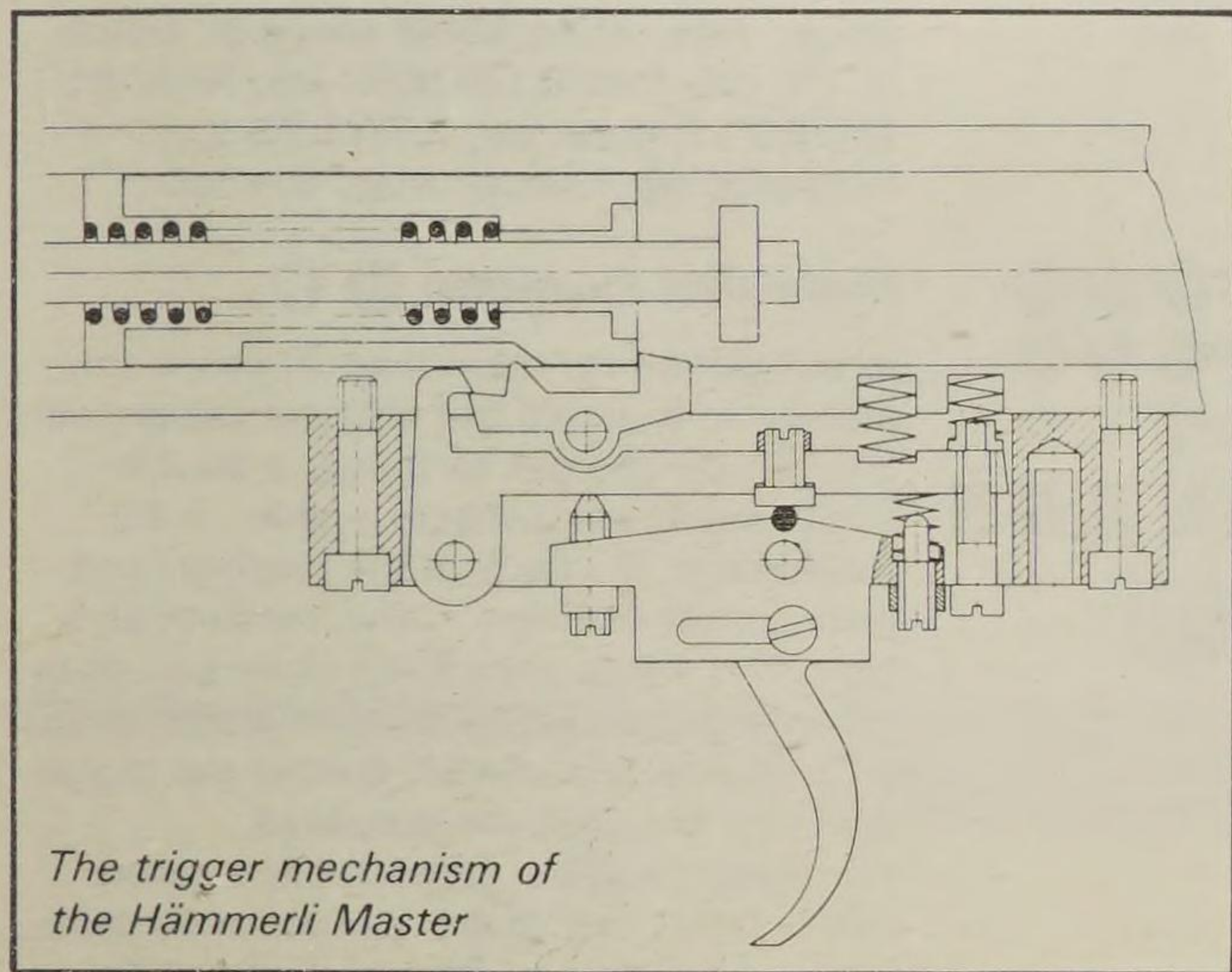
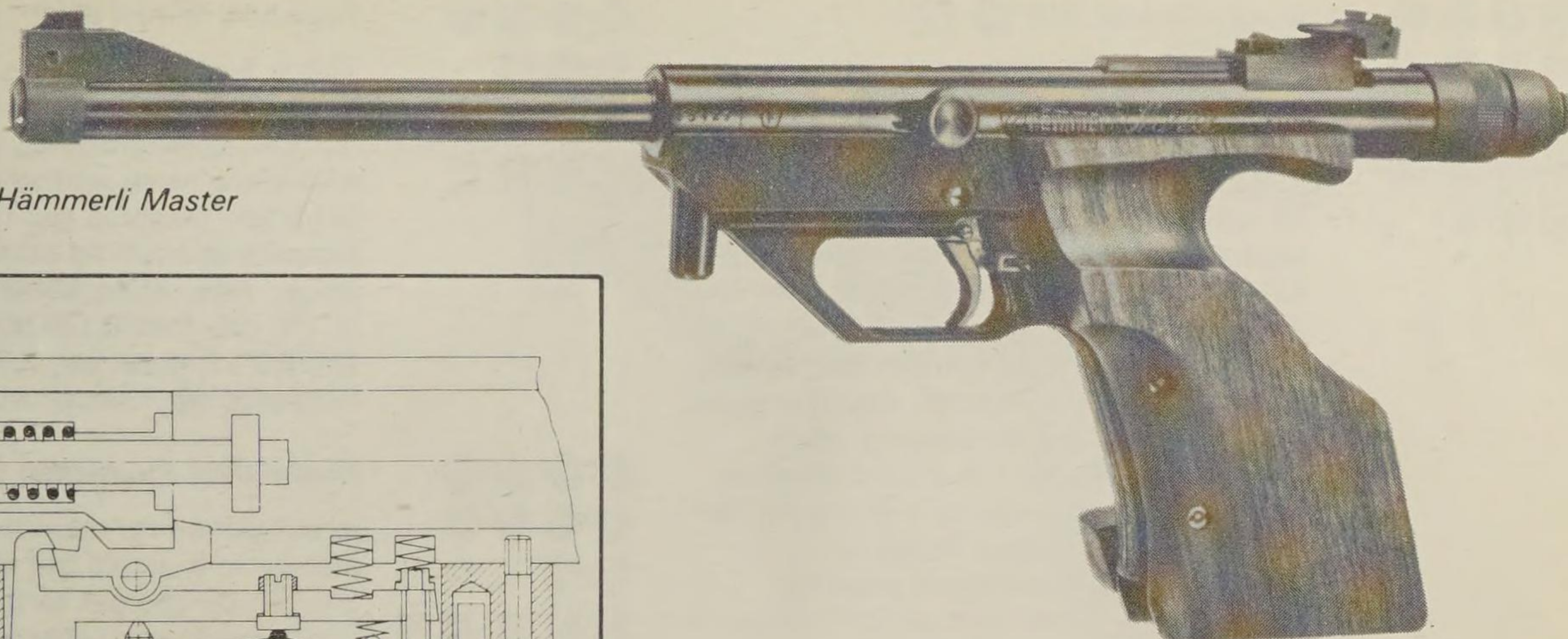
Cadet/Cadet Mehrlader

This was a derivative of the Junior with a bolt-action cocking system, the handle for which lies on the right side of the receiver ahead of the recess for the gas cartridge. An 80-shot magazine BB firing version (Cadet Mehrlader) was made in the late 1960s. *Type*, fixed-barrel gas-powered rifle, auto-opening breech; *cl*, R4; *cal*, 4.5/0.175 (BB); *loa*, 1,055/41.5; *bl*, 590/23.3; *rf*, 12R; *wt*, 2.72/6.00; *s*, synthetic; *sft*, none; *mag*, 80-shot tube.

Master (Model 454)

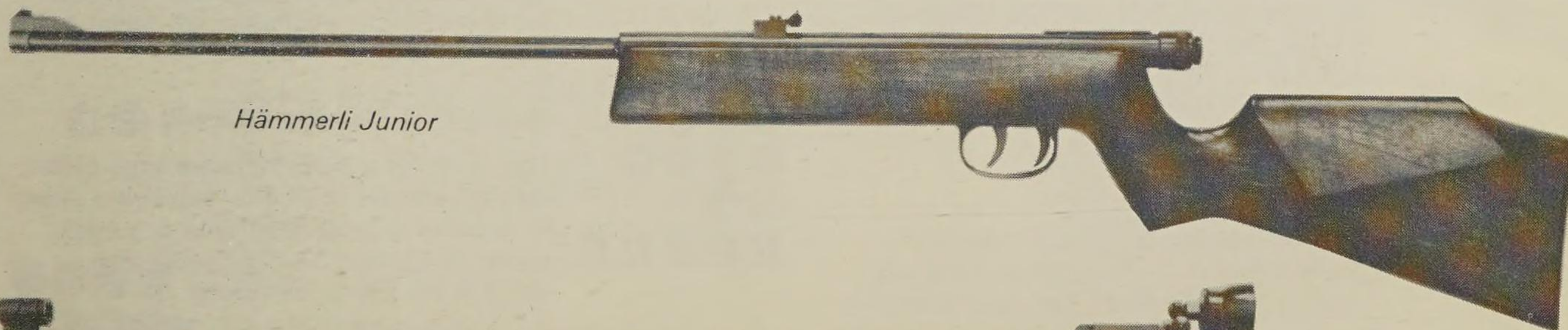
The Master is an improved version of the Single with a longer barrel, an additional trigger adjustment and a rail-mounted replaceable-notch back sight that could be locked in six different positions. A new trigger system with an intermediate tumbler was developed in 1972. The Hämmerli won the German national championship between 1965 and 1967, but was subsequently overshadowed by the

Hämmerli Master



The trigger mechanism of the Hämmerli Master

Hämmerli Junior



Hämmerli Match



Feinwerkbau LP65, which was less susceptible to variations in ambient temperature. *Type*, fixed-barrel gas-powered pistol, auto-opening breech; *cl*, C1; *cal*, 4.5/0.177; *loa*, 405/15.9; *bl*, 165/6.5; *rf*, 12R; *wt*, 1.07/2.36; *s*, synthetic; *sft*, none.



Junior (Model 471)

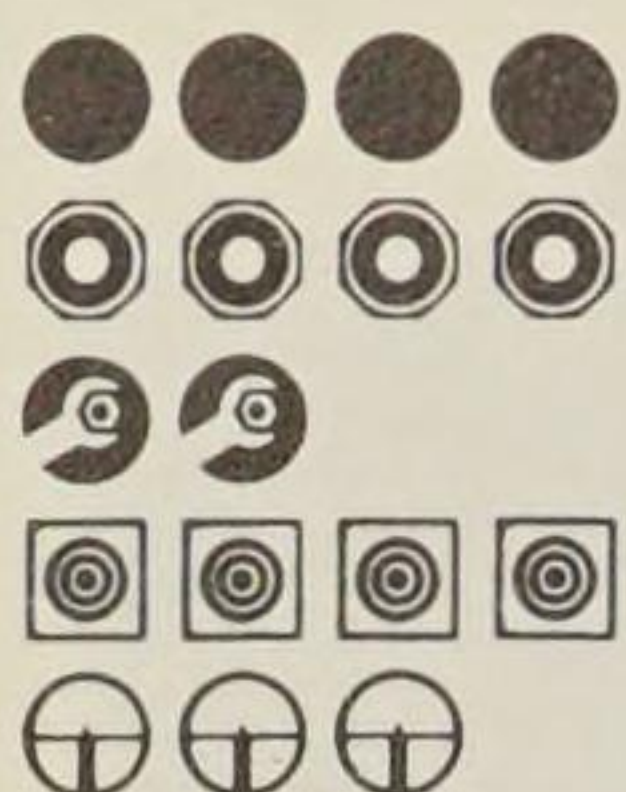
This was a lighter version of the Match, but without the barrel sleeve or the competition sights. Instead, a ramp-mounted blade appeared at the muzzle and a small micro-adjustable open notch above the fore-end. The Junior stock lacks the Match-style rubber butt-plate. *Type*, fixed-barrel gas-powered rifle, auto-opening breech; *cl*, M3; *cal*, 4.5/0.177; *loa*, 1,055/41.5; *bl*,



590/23.3; *rf*, 12R; *wt*, 2.72/6.00; *s*, synthetic; *sft*, none.

Match (Model 472)

Dating from 1962, this has a similar action to the pistols, but is cocked by the front 'trigger' lever; the breechblock, which opens automatically, must be closed manually before each shot. The stock is a most distinctive design, a micro-adjustable aperture sight lies above the receiver, the front sight is a replaceable-element tunnel and there is a heavy barrel sleeve. *Type*, fixed-barrel gas-powered rifle, auto-opening breech; *cl*, M2; *cal*, 4.5/0.177; *loa*, 1,055/41.5; *bl*, 590/23.3; *rf*, 12R; *wt*, 4.34/9.57; *s*, synthetic; *sft*, none.



Single (Model 452) FAC F

The Single appeared in 1961 after several years' research. Production ceased in 1978, but many guns are still seen. The gas cartridge lies in the cylindrical receiver but an optional adaptor permits charging from a separate container. The action of the last CO₂ Singles incorporates the constant metering system of the Master, which virtually eliminates the problem of declining velocity as the gas cylinder empties. Residual gases were vented to the atmosphere when pressure had dropped to a predetermined level. The Single cocks by pushing the two knobs above the trigger forward, whereupon the breechblock pops up automatically at the front of the receiver; it must be pressed back manually after loading. The trigger is adjustable for weight (1000–400gm) and travel, while over-travel is restricted by a screw-retained slider. Sights comprise a blade and a micro-adjustable open notch; originally, these were in a fixed housing but later the sliding type of the Master were used. Wood grips and a barrel weight were among the optional extras. *Type*, fixed-barrel gas-powered pistol, auto-opening breech; *cl*, C1/C2; *cal*, 4.5/0.177; *loa*, 13.8/350; *bl*, 115/4.5; *rf*, 12R; *wt*, 1.00/2.21; *s*, synthetic; *sft*, none.

HARRINGTON

T. J. Harrington & Co. Ltd., Walton, Surrey, England. US distributor: various retail outlets; Standard warranty: none.

Harrington manufacture the Gat, which was originally introduced in about 1937.

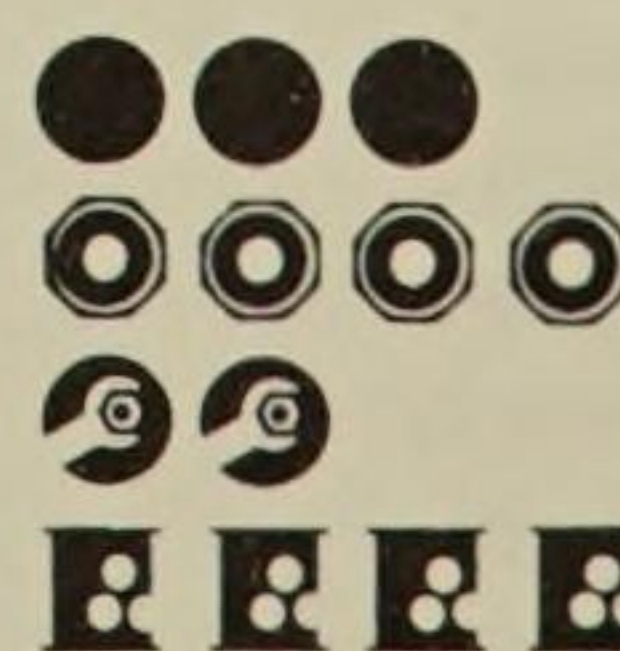
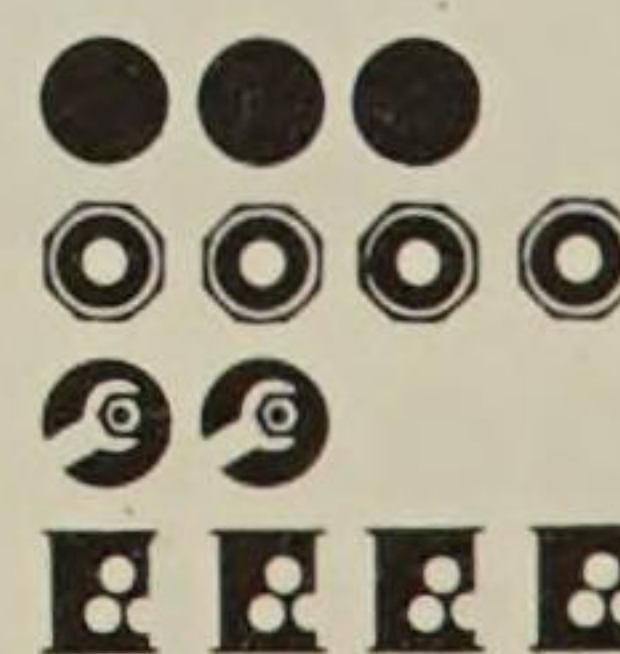
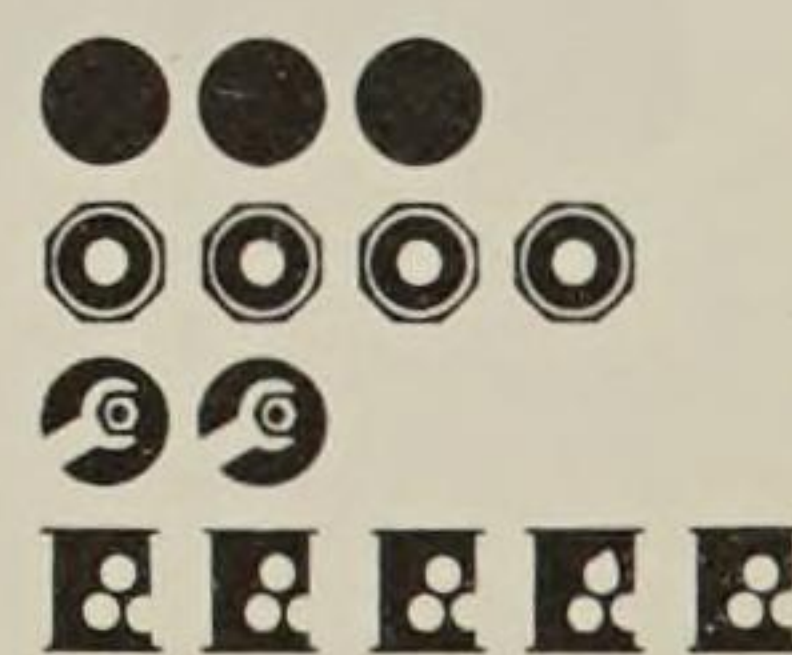
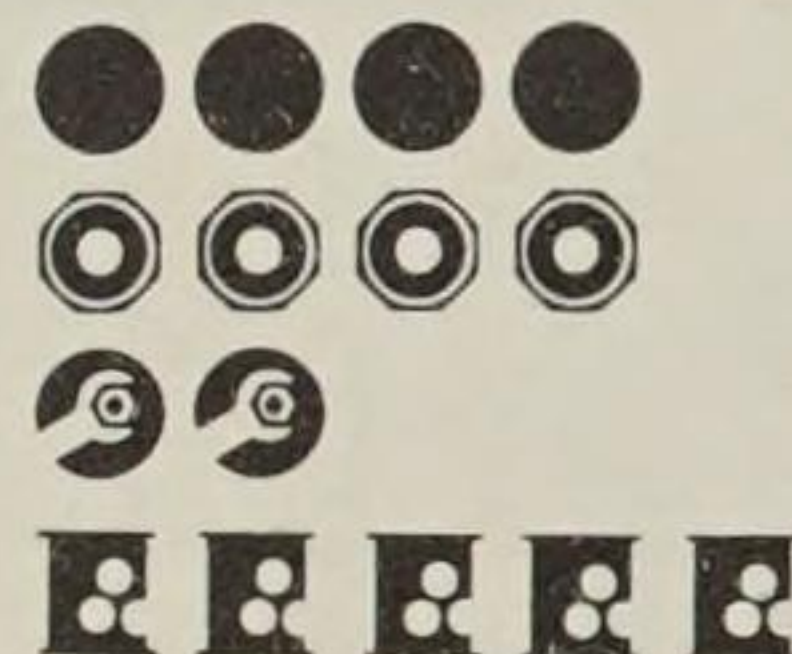
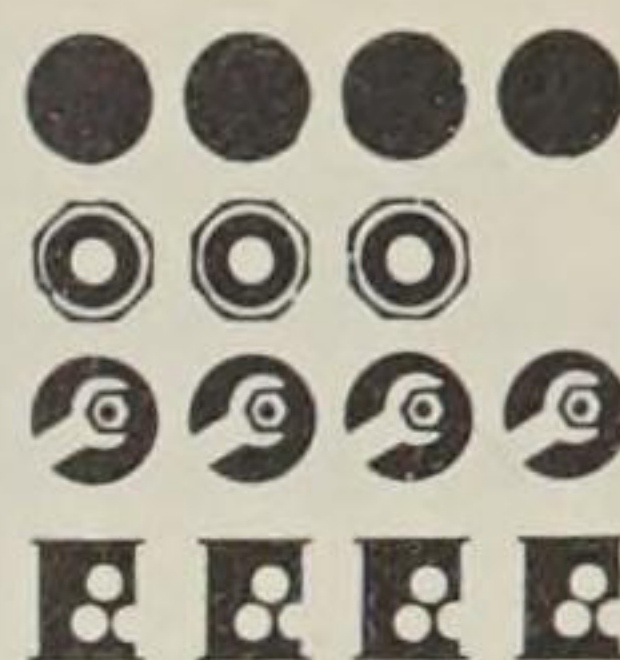
Gat

An extremely low-cost cast-alloy design, available in nickel or black finish, the Gat suffers all the problems associated with push-in barrel guns. It is little more than a toy and will fire pellets, darts, corks and similar projectiles. *Type*, push-in barrel spring-air pistol; *cl*, P5; *cal*, 4.5/0.177; *loa*, 229/9.0; *bl*, approximately 152/6.0; *rf*, none; *wt*, 0.51/1.12; *ps*, leather or synthetic washer; *bs*, synthetic; *sft*, none.

HEALTHWAYS

Healthways Inc., Compton, California, USA. UK distributor: none (Topscore, formerly Parker-Hale); Standard warranty: 90 days*.

Most Healthways guns are gas-powered pistols designed by Richard Kline and Kenneth Pitcher in 1955–56, and patented in the late 1950s (see GB 833,803, sought in July 1957).



Topscore Model 9100

This is a simple BB-firing 'fun gun' cocked by lifting the barrel, which is pivoted at the rear of the receiver. It is quite well made, with a one-piece synthetic grip/frame unit, but is low-powered and not especially accurate at anything other than very short range. *Type*, lifting-barrel spring-air pistol; *cl*, P5; *cal*, 4.45/0.175 (BB); *loa*, N/A; *bl*, 165/6.5; *rf*, none; *wt*, 0.77/1.70; *s*, synthetic; *sft*, manual; *mag*, 50-shot.

Model 9401 Plainsman FAC F

In production for more than 20 years, the Plainsman is an old but efficient design with a butt-mounted gas cartridge, a double-action autoloading trigger system, a BB magazine in the back of the receiver, and three power settings – low, medium and high. The sights are a fixed blade and open-notch; a thumb safety lies on the left side of the frame immediately behind the trigger aperture; the grips are simulated woodgrain; and the finish is black epoxy paint. *Type*, fixed-barrel gas-powered semi-automatic pistol; *cl*, P5; *cal*, 4.45/0.175 (BB); *loa*, 240/9.4; *bl*, 150/5.9; *rf*, none; *wt*, 0.78/1.72; *s*, synthetic; *sft*, manual; *mag*, 100-shot.

Model 9404 Plainsman Shorty FAC F

This is simply a short-barrelled large-calibre derivative of the standard Plainsman. *Type*, fixed-barrel gas-powered semi-automatic pistol; *cl*, P5; *cal*, 5.5/0.22 (ball); *loa*, 190/7.5; *bl*, 100/3.9; *rf*, none; *wt*, 0.75/1.65; *s*, synthetic; *sft*, manual; *mag*, 40-shot.

Model 9405 Plainsmaster FAC F

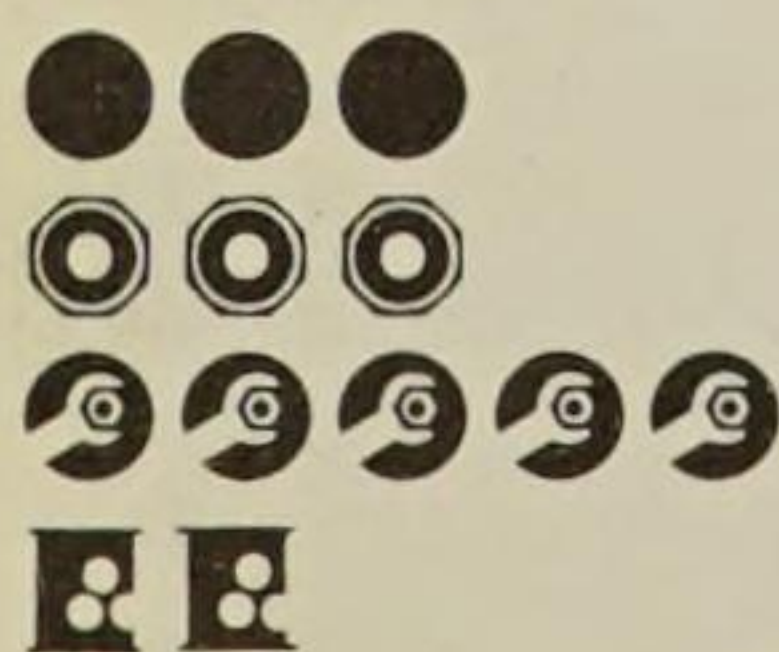
The Plainsmaster is simply a Plainsman with a longer barrel, a plastic fore-end and a removable front hand grip. *Type*, fixed-barrel gas-powered semi-automatic pistol; *cl*, P5; *cal*, 4.45/0.175 (BB); *loa*, 330/13.0; *bl*, 240/9.4; *rf*, none; *wt*, 1.15/2.54; *s*, synthetic; *sft*, manual; *mag*, 100-shot.

Model 9406 Plainsmaster FAC F

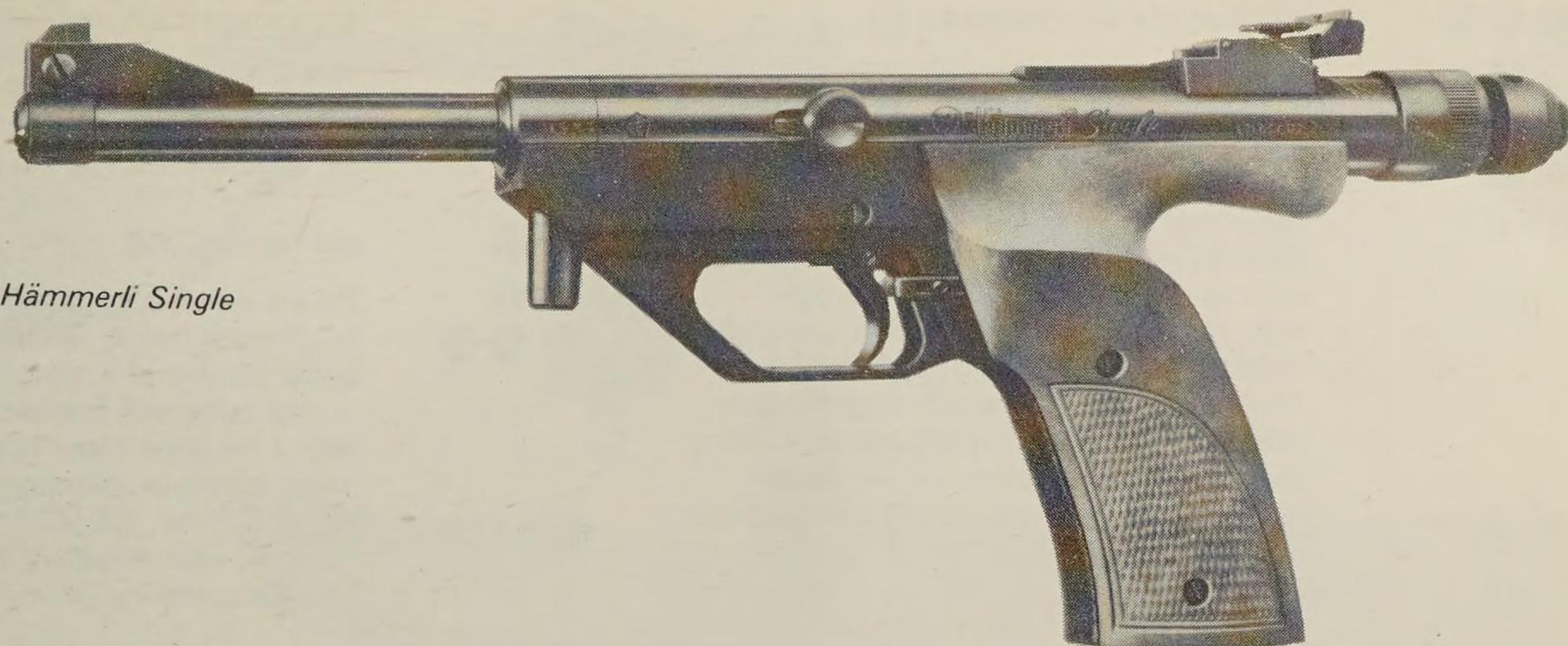
A larger-calibre version of the 9405, the 9406 has the same long barrel and fore-end. *Type*, fixed-barrel gas-powered semi-automatic pistol; *cl*, P5; *cal*, 5.5/0.22 (ball); *loa*, 330/13.0; *bl*, 240/9.4; *rf*, none; *wt*, 1.15/2.54; *s*, synthetic; *sft*, manual; *mag*, 40-shot.

HOWA

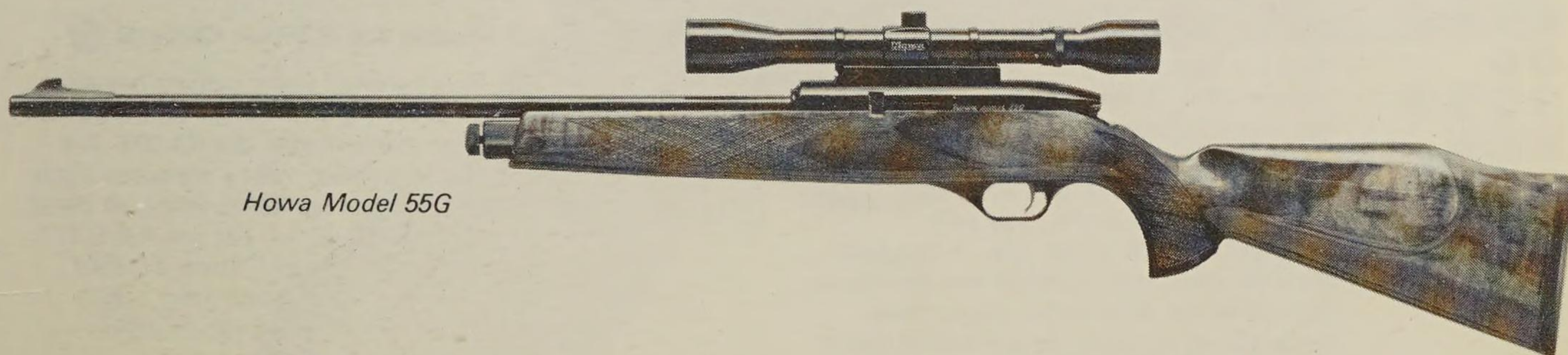
Howa Machinery Ltd., Sukaguchi, Shinkawa-cho, Nishikasugai-gun, Aichi, Japan. UK distributors: none; US distributors: none; Standard warranty: not known.



Hämmerli Single



Howa Model 55G



Howa makes rifles, shotguns and associated items for Smith & Wesson and Weatherby, and also a gas-powered rifle modelled on the Weatherby Mk V semi-automatic.

Model 55G

The complicated Howa is rarely seen outside Japan, though it offers some very advanced features. Power is derived from two carbon dioxide cartridges which lie back to back in the cylinder beneath the barrel. The handle of the bolt-loading system turns down above the trigger aperture. The bolt actuates a laterally moving breechblock, which takes pellets from the tube magazine on the left side of the receiver; the bolt will not close on an empty magazine unless the charging rod is retracted. The 55G has an elegant one-piece synthetic stock and is usually seen with a telescope sight, though it may be fitted with an alternative, rather crude, open-notch back sight. *Type*, fixed-barrel gas-powered rifle; *cl*, R1/R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 982/38.7; *bl*, 524/20.6; *rf*, 8R; *wt*, 2.70/5.95; *s*, synthetic; *sft*, manual; *mag*, 5-shot tube.

HY-SCORE

Hy-Score Arms Co., 200 Tillary Street, Brooklyn, New York 11201, USA. UK distributor: none; Standard warranty: unknown.

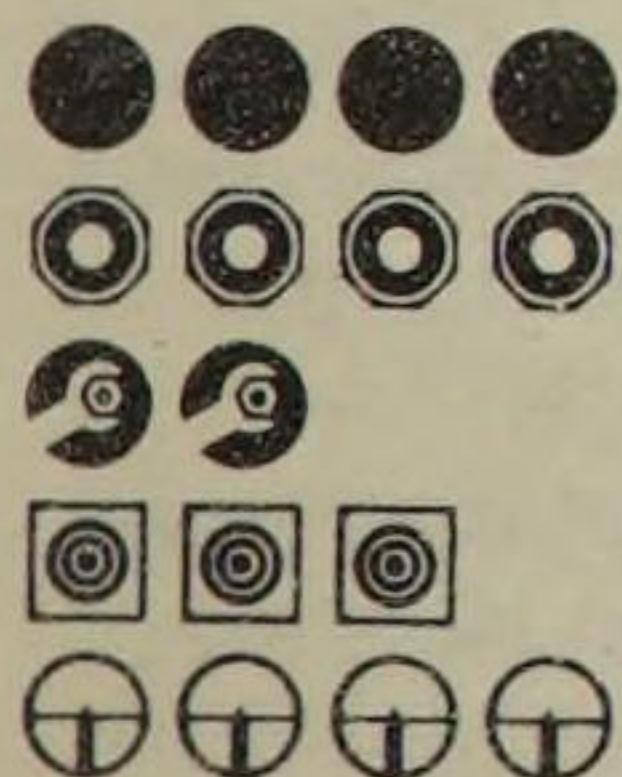
This company, who distribute Hämmerli, some Original Dianas and other guns, also

marketed the Hy-Score spring-air pistol – an interesting gun designed by Andrew Lawrence and Stephen Laszlo, and patented in Britain in 1946. The gun has an extremely long barrel, made possible by a concentric mainspring surrounding the breech, and loaded through a port at the breech. There were two basic versions, Model 800 (a single-shot type in 0.22in calibre) and Model 802, a five-shot repeater. Short barrel versions (801 and 804) were also made for a short time. Stephen Laszlo died in 1980 – though no guns had been made for some years – and the immediate future of his company looks uncertain.

ITALGUNS

Italguns SRL, Viale Alessandro Volta 60, I-20090 Cusago/Milano, Italy. UK distributor: Sussex Armoury, David Nickerson, Millard Brothers Ltd. (R071, R072), David Nickerson Ltd. (IGI 214), Norman May & Co. (CU400); US distributor: enquiries to Igi-Domino Corp, 200 Madison Avenue, New York, NY 10016, USA; Standard warranty: usually none.

Italguns was founded in 1965 to market the products of a number of independent gunsmiths, including Gun Toys and Modesto Molgora (Mondial).





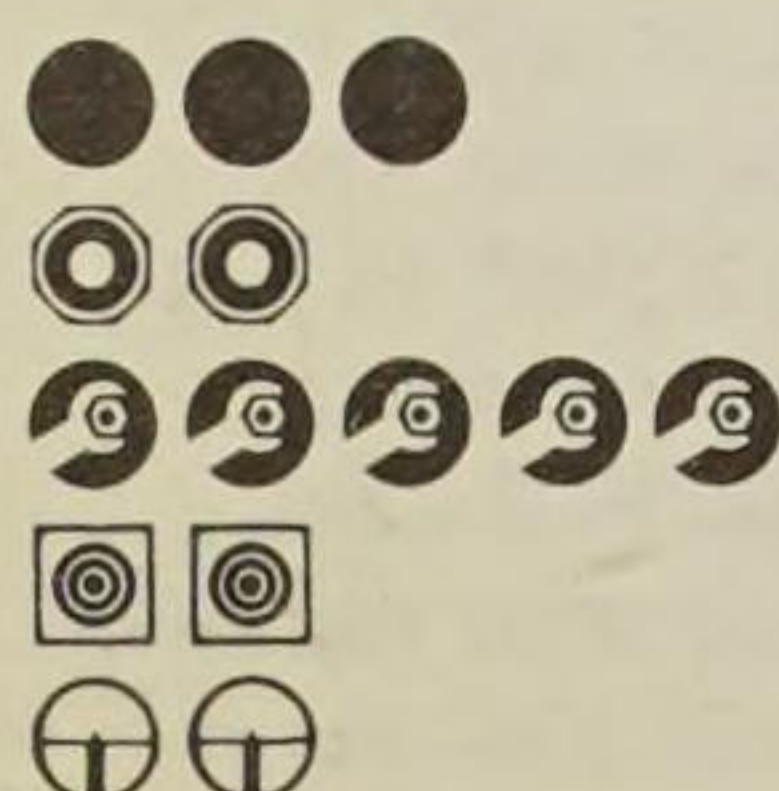
IGI Modelo 202 (Panther)

Otherwise known as the Gun Toys RO71 – its manufacturer's designation – or in Britain as the Panther or Classic, this low-powered unsophisticated pistol offers little other than incredibly low price. Its better features include a replaceable-element front sight and a fully adjustable back sight – both plastic – and reasonably comfortably moulded plastic grips. The gun is largely made from castings, which is particularly evident in the zinc-alloy articulated cocking lever and trigger systems. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P4; *cal*, 4.5/0.177; *loa*, 349/13.7; *bl*, 177/7.0; *rf*, 12R; *wt*, 1.03/2.27; *ps*, synthetic washer; *bs*, nylon O-ring; *sft*, none.



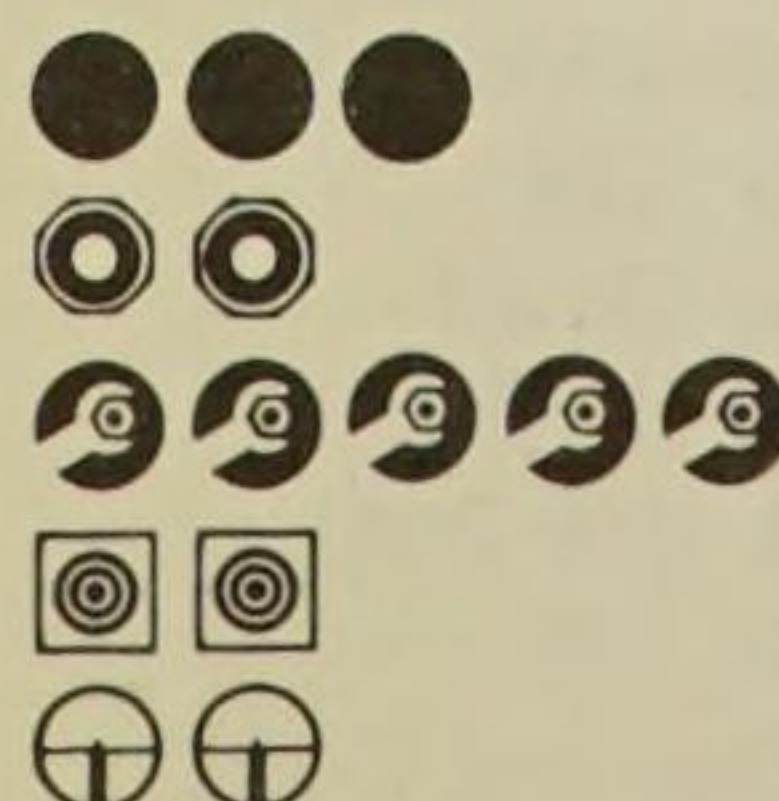
IGI Modelo 203 (Panther de Luxe)

Alias the Gun Toys RO72 Bullseye, this improvement on the IGI 202 displays similar low-cost production techniques and identical sights. The 203 has a two-stage trigger, adjustable for pull length, an automatic safety, and a large and comfortable black plastic grip. A rod-type shoulder stock may be fitted into the cap at the end of the air cylinder. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, C3:P4; *cal*, 4.5/0.177; *loa*, 360/14.2; *bl*, 184/7.2; *rf*, 12R; *wt*, 1.06/2.34; *ps*, synthetic washer; *bs*, nylon O-ring; *sft*, automatic.



IGI Modelo 205 (Oklahoma)

The cheaply-made alloy 205 is made by Modesto Molgora (Mondial) rather than Gun Toys, and dates from the early 1960s. It is externally similar to the 202, but has a fixed open back sight on the barrel block, a different front sight and a pendant lever or catch under the frame in front of the trigger. *Type*, break-barrel spring-air pistol, detent-locked; *cl*, P4; *cal*, 4.5/0.177; *loa*, approximately 310/12.2; *bl*, approximately 160/6.3; *wt*, N/A; *ps*, synthetic washer; *bs*, nylon O-ring; *sft*, none.



IGI Modelo 206 (Zip)

Another of the Molgora-made guns, the Zip is also made largely of cheap alloys. It has the tunnel front sight of the 205, a fully adjustable back sight, a bifurcated cocking lever outside the frame and a well-raked plastic grip. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P4; *cal*, 4.5/0.177; *loa*, 343/13.5; *bl*, 177/7.0; *rf*, 12R; *wt*, 0.98/2.06; *ps*, synthetic washer; *bs*, nylon O-ring; *sft*, none.



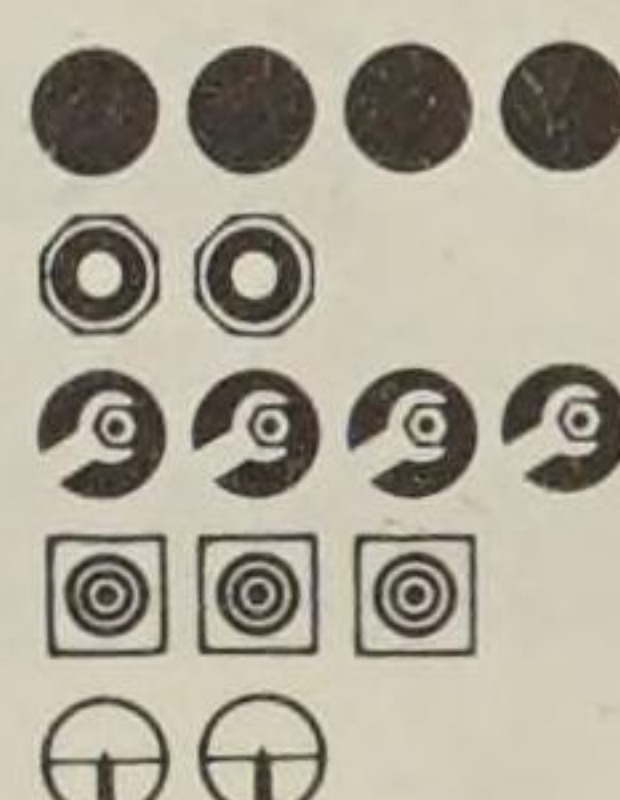
IGI Modelo 214 (York)

This unsophisticated but cheap light rifle is probably made by Molgora as it shares the Zip rear sight. The adjustable back sight and the robust wooden stock are its best features. The metalwork and internal finish



IGI Modelo 215

This is simply the 203 pistol with a lengthened barrel, the back sight on the barrel block and a rather curiously shaped – but quite well finished – wood stock with a separate pistol grip. *Type*, break-barrel spring-air pistol carbine; *cl*, R5; *cal*, 4.5/0.177; *loa*, 830/32.7; *bl*, 330/13.0; *rf*, 12R; *wt*, approximately 1.60/3.50; *ps*, synthetic washer; *bs*, nylon O-ring; *sft*, none.



IGI Modelo 216 (Panther Carbine)

This long-barrelled pistol carbine has a detachable rod-type shoulder stock, but is otherwise identical with the IGI 203. It is usually encountered with a telescope sight bracket. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P4; *cal*, 4.5/0.177; *loa*, 885/34.8 with stock fitted; *bl*, 330/13.0; *rf*, 12R; *wt*, approximately 1.35/2.98; *ps*, synthetic washers; *bs*, nylon O-ring; *sft*, automatic.

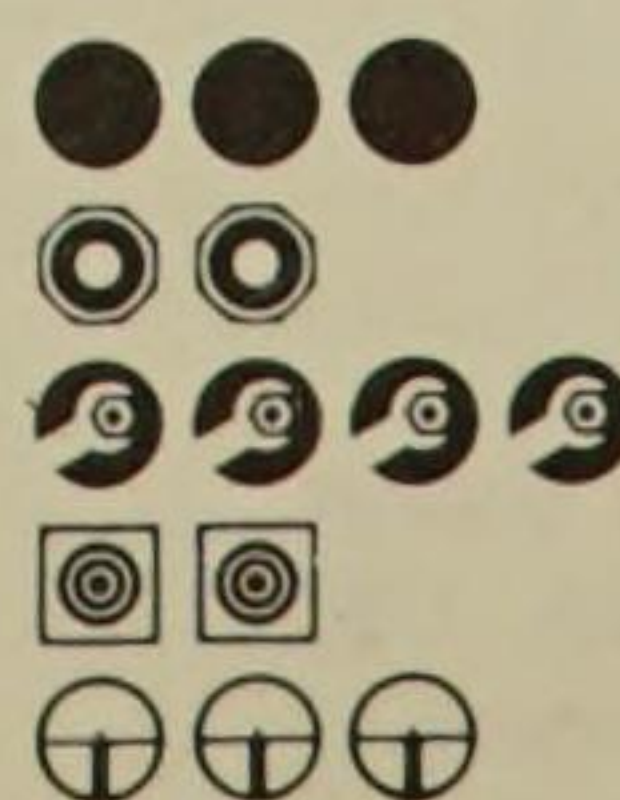


IGI Air Match CU400

After the uninspiring, low-price Italguns comes the highly sophisticated CU400, an attractive and competitively priced single-stroke pneumatic target pistol modelled on the well known IGI Domino cartridge pistol. Its trigger is adjustable down to 0.2kg, there are proper micro-adjustable competition sights with four optional front sight blades and two back sight notches, non-adjustable palm-rest type walnut grips and separate auxiliary weights. The CU400 has yet to appear in large numbers, however. *Type*, fixed-barrel sidelever-cocking recoilless single-stroke pneumatic pistol; *cl*, C1/C2; *cal*, 4.5/0.177; *loa*, 330/13.0; *bl*, 225/8.9; *rf*, 12R; *wt*, 0.99/2.18; *s*, synthetic; *sft*, automatic.

IZHEVSKII

Izhevskii Oruzheinyi Zavod, Izhevsk, USSR.
UK distributor: Millard Brothers; US distributor: Universal Sporting Goods; Standard warranty: none?



Baikal/Vostok

This soundly-made but rather poorly finished airgun has a robust, hardwood pistol-grip stock. The sights consist of an open bead and a vertically-adjustable spring-leaf. Muzzle velocity is surprisingly high considering its design, and the price is very competitive. The gun is usually supplied with a kit of spare parts. *Type*,



Italguns IGI Modelo 216



Italguns IGI Air Match CU400



Juaristi Super-Especial

break-barrel spring-air rifle, detent-locked (bolt?); *cl*, R3; *cal*, 4.5/0.177; *loa*, 1,035/40.7; *bl*, 455/17.9; *rf*, 12R; *wt*, 2.40/5.29; *ps*, leather washer; *bs*, leather O-ring; *sft*, automatic.

JUARISTI

Armas Juaristi, Chonta 16, Eibar (Guipúzcoa), Spain. UK distributor: none; US distributor: none; Standard warranty: unknown.

The products of this small gunmaking company are rarely seen outside Spain, but appear to offer acceptable quality at a competitive price.

Modelo Ideal Extra

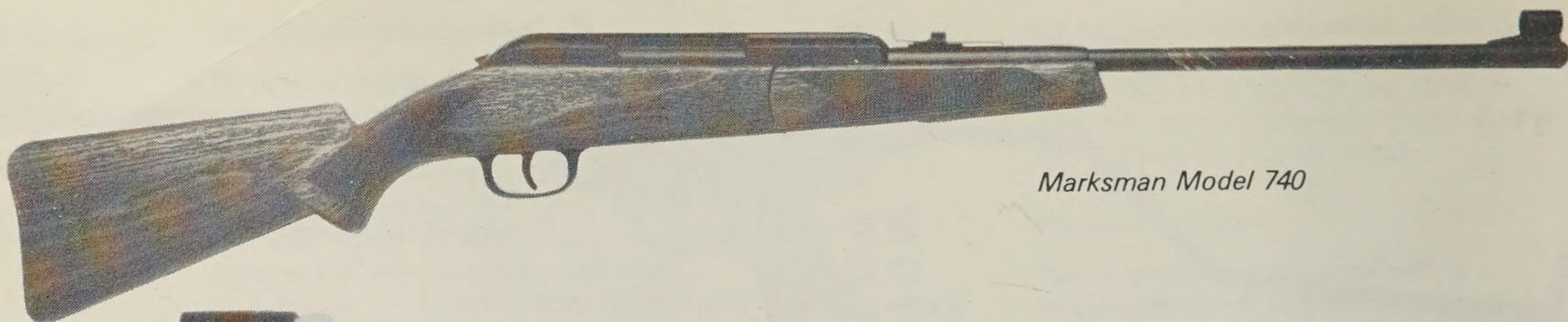
This soundly-made, if conventional, design has a plain pistol-grip stock, a separate butt-plate and a grasping groove in the fore-end. It has a simple trigger, a protected post front sight and a fully

adjustable open-notch back sight, but lacks telescope sight rails. *Type*, break-barrel spring-air rifle, detent-locked (ball?); *cl*, R3/R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,040/40.9; *bl*, about 450/17.7; *rf*, optional; *wt*, 2.65/5.84; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

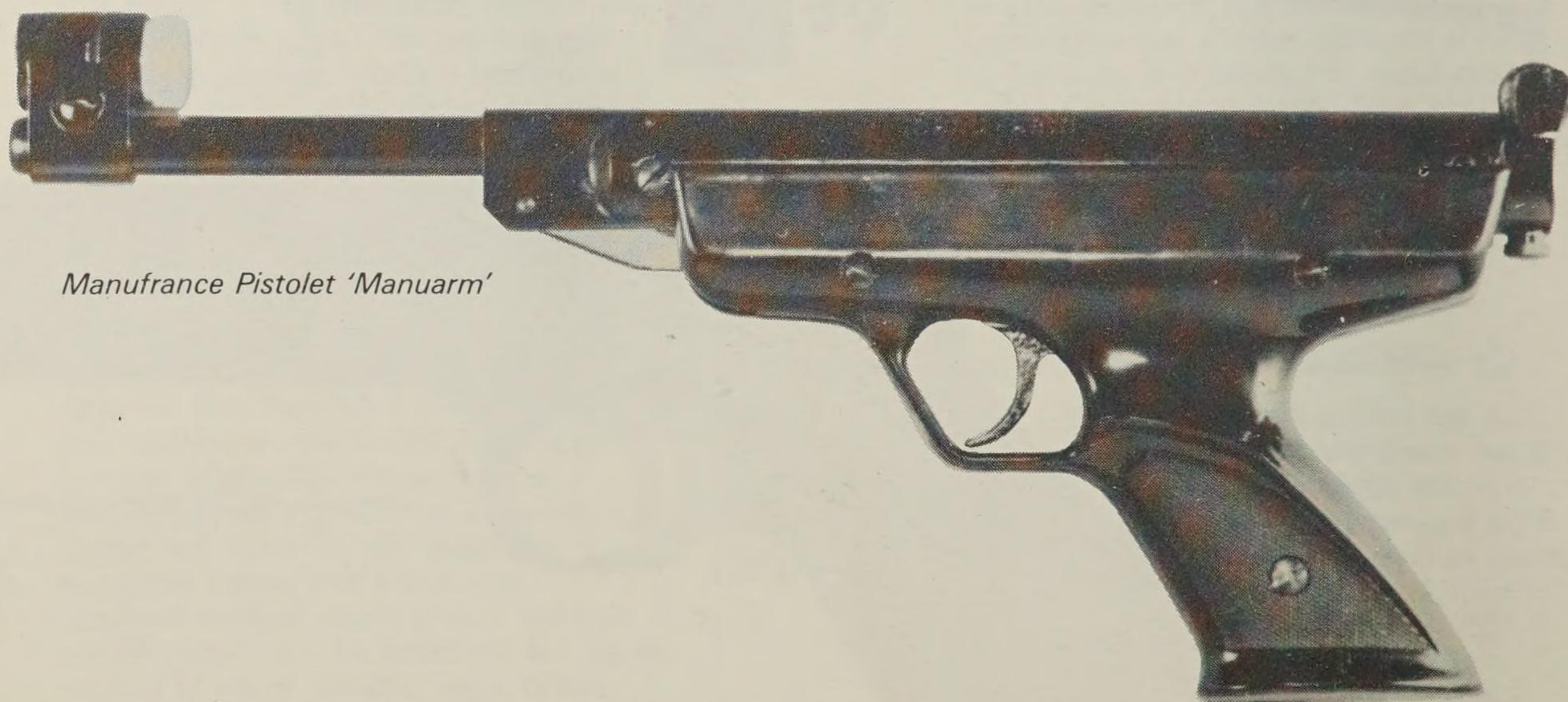
Modelo Super-Especial

This differs considerably from the Ideal Extra, featuring a hemispherical cylinder end-cap, a telescope sight rail above the receiver, a replaceable-element front sight and a different fully adjustable open-notch back sight. The design of the barrel block and cocking lever are most distinctive, and the externally well finished stock has a deep fore-end, a chequered pistol grip and a separate butt-plate. *Type*, break-barrel spring-air rifle, detent-locked (ball?); *cl*, R3/R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,100/43.3; *bl*, approximately 450/17.7; *rf*, optional; *wt*, 3.00/6.62; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.





Marksman Model 740



Manufrance Pistolet 'Manuarm'



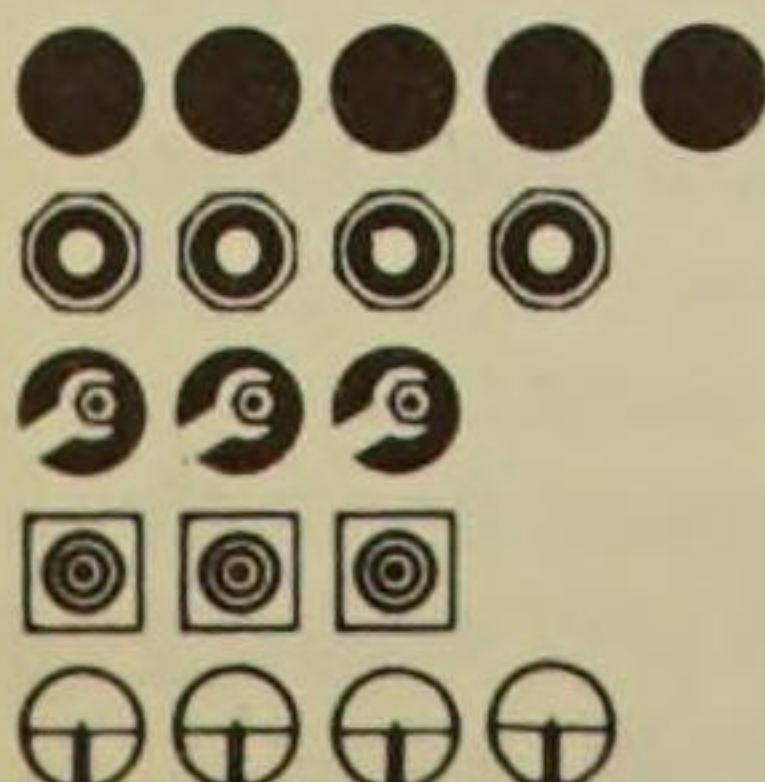
Modelo Super-Especial con Carrillera

This version of the Super-Especial lacks the fore-end grasping groove, but has a cheekpiece, a chequered pistol grip and a spacer accompanying the butt-plate. *Type*, break-barrel spring-air rifle, detent-locked (ball?); *cl*, R3/R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,120/44.1; *bl*, approximately 450/17.7; *rf*, optional; *wt*, 2.65/5.84; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

MAG

Manchester Air Guns (MAG), 470 Oldham Road, Failsworth, Manchester, England. US distributor: none; Standard warranty: 12 months?

This specialist retailer of airguns, accessories and ammunition has recently entered the 'manufacturing' field, marketing BSA Mercury rifles with their barrels rebored to the increasingly popular 5mm/0.20in and 6.33mm/0.25in calibres.



MAG Mercury Magnum

These are simply BSA Mercury Mk 3 rifles with their barrels bored-out and re-rifled to two other calibres. The well finished rifling is cut by hand, at the time of writing, and the guns – incorporating the proven BSA Power Seal piston system – perform extremely well. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2; *cal*, 5.0/0.20 or 6.33/0.25; *loa*, 1,105/43.5; *bl*, 470/18.5; *rf*, 8R; *wt*, 3.23/7.12; *ps*,

synthetic O-ring; *bs*, synthetic O-ring; *sft*, automatic.

MANUFRANCE

Manufrance SA, 31 – 57 Cours Fauriel, 42033 St Etienne Cedex, France. UK distributor: L. J. Cammell (Merseyside) Ltd.; US distributor: none; Standard warranty: unknown.

Formerly known as Manufacture Française d'Armes et Cycles (MFAC), this well-known maker of military and sporting firearms – one of the few French airgun manufacturers – once made Giffard gas guns. The quality of the modern guns, however, is not particularly high.



Pistolet 'Manuarm'

This inexpensive pistol features low-cost cast alloy construction reminiscent of the IGI 203 (see page 78). Alloy parts include the black-painted air cylinder and the articulated cocking lever. The barrel is very well rifled and there are good target-style sights: a replaceable-insert tunnel-pattern front sight and a micro-adjustable open notch on the cylinder end-cap, controlled by discs under the cap and on the sight block. The two-stage trigger system has a ball sear giving a crisp though rather stiff trigger pull. The black plastic grips display remarkably fine-quality chequering but the thumb-rest, in particular, has a rather slippery feel. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 364/14.3; *bl*,

185/7.3; *rf*, 10R; *wt*, 1.23/2.71; *ps*, leather washer; *bs*, neoprene O-ring; *sft*, none.

Carabine 'Manuarm'

This is, in some ways, an enlargement of the Manuarm pistol with a rifle-size action, hooded blade and adjustable open-notch sights and a synthetic stock with a curiously shaped separate pistol grip. A coloured plastic spacer accompanies the butt-plate and the pistol-grip cap, and a telescope sight rail appears above the receiver. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, approximately 952/37.5; *bl*, approximately 381/15.0; *rf*, 10R; *wt*, N/A; *ps*, leather washer; *bs*, neoprene O-ring; *sft*, none.

MARKSMAN

Marksman Products Inc., 2133 Dominguez Street, Torrance, California 90509, USA. UK distributor: Millard Brothers; Standard warranty: 90 days*.

Marksman makes a range of low-cost guns, including a pistol originally developed by the Harris company in 1955–56. In addition, small numbers of the Milbro Diana G80 were sold in the late 1970s as the Model 746.

Model 740

This cheap repeating BB gun, which will also handle singly-loaded pellets or darts, has a receiver of cast alloy, an adjustable back sight and a simulated-walnut synthetic stock (some early guns may display hardwood stocks). *Type*, break-barrel spring-air gun, detent-locked; *cl*, R5; *cal*, 4.4/0.175 (BB); *loa*, 927/36.5; *bl*, 394/15.5; *rf*, none; *wt*, 1.87/4.12; *s*, synthetic; *sft*, semi-automatic; *mag*, 100-shot.

Model 742

This derivative of the 740 exhibits a fixed back sight, but the two are otherwise identical. See Model 740 for details.

Models 1010 and 1020

These feature much the same lines as the Colt M1911A1 automatic pistol, slide-action cocking and a barrel block that tips to load pellets or darts (1010 only). There are simple fixed sights and a manual safety system. The pistols develop low power and are not particularly accurate, but are intended solely as short-range 'fun guns'. *Type*, slide-cocking spring-air pistol; *cl*, P5; *cal*, 1010, 4.5/0.177 (pellet or BB), 1020, 4.45/0.175 (BB only); *loa*, 210/8.3; *bl*, 64/2.5; *rf*, none; *wt*, 0.70/1.54; *s*, synthetic; *sft*, manual; *mag*, 20-shot.

MARSHALL

Marshall's Custom Airguns, 12 Wimborne Court, Wimbourne Street, London N1, England. US distributor: none; Standard warranty: 12 months?

This company produces improved derivatives of several Crosman pneumatics, including the 761XL, 766 and 1377. Peter Marshall designed the virtually identical Whaley-Crosman (see page 116) before commencing his separate operation.

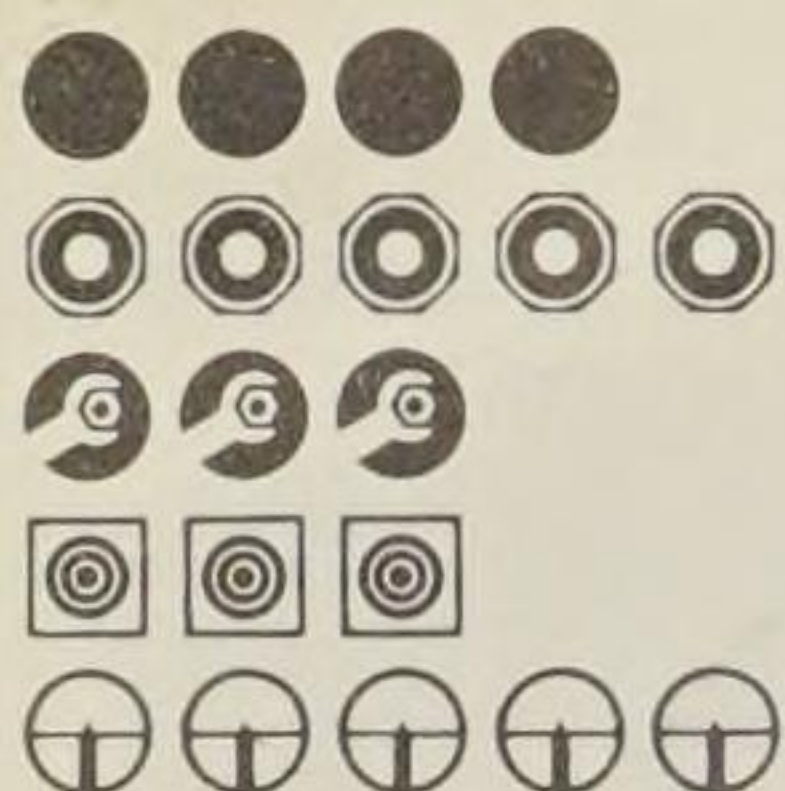
Marshall-Crosman 761XL

This gun uses the proven Crosman valve as a reservoir, containing air at sufficient pressure to provide several shots from a single charge. Alternatively, a few pumps can replenish the contents after one shot to give surprisingly consistent velocity. However, it is advisable to exhaust the reservoir after a few shots and begin the pump-sequence again; this ensures maximum consistency and minimal valve damage as the valve heats up during use and must occasionally be allowed to cool. 8–10 pumps gives maximum velocity, while 15 may give three shots at considerable velocity depending on the individual gun. The valve design is claimed to prevent breaking the legal limit of 12fp, but whether this holds for every combination of pellet and gun has not been investigated. The Marshall-Crosman is extremely powerful, recoilless, but rather lightly built. It has a distinctive full-length grooved fore-end/pump handle and a completely rebuilt pump linkage. *Type*, fixed-barrel swinging fore-end multi-stroke pneumatic rifle; *cl*, R1/R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 898/3.54; *bl*, 475/18.7; *rf*, optional 10R; *wt*, 2.65/5.84; *s*, synthetic; *sft*, manual.

MAY

Norman May & Co., Union House, 2 Princess Terrace, Bridlington, North Yorkshire, England. US distributor: none; Standard warranty: 12 months.

May distributes BSF, Hämmerli and Weihrauch airguns, and Bimoco pellets. Research undertaken in the late 1970s has led to the Weihrauch-based Vixen rifle, in addition to some Bimoco-made pellet designs.



Normay Vixen

This features an entirely redesigned piston and mainspring assembly, improving efficiency, consistency and power. The piston and interior of the air cylinder have been chrome-plated, which, together with the Swedish-steel spring and other friction-reducing aids, has radically changed the shooting characteristics. The Vixen displays a short, sharp recoil/spring-surge effect quite unlike the standard HW35. It has a nickel-plated barrel-lock and its designation is inlaid in gold on the right side of the barrel-block; undeniably expensive, it rates high among the finest sporting guns. Details for the Vixen are generally as Weihrauch HW35, HW35L or HW35E, depending on version.

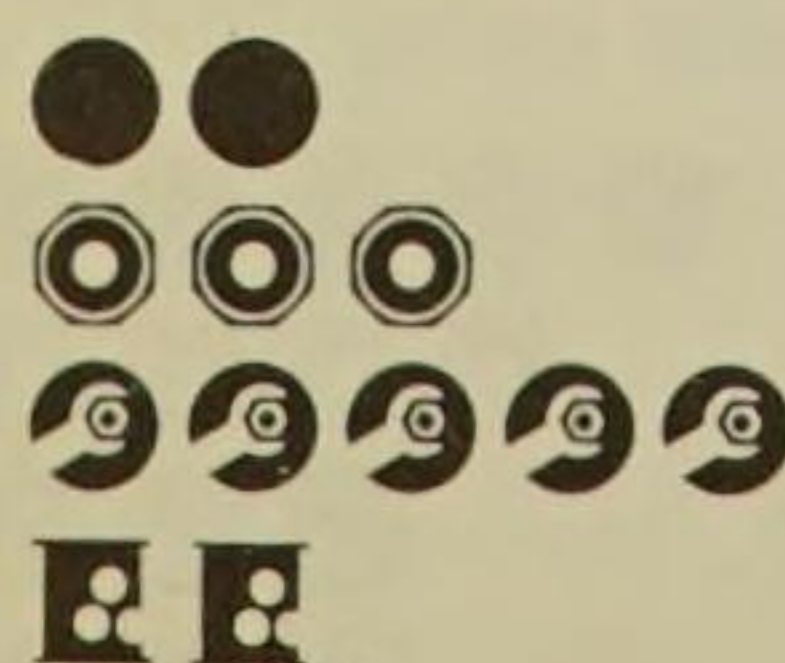
MAYER & GRAMMELSPACHER

Mayer & Grammelspacher, Dianawerk, D-7550 Rastatt/Baden, Karlstrasse 34, West Germany. UK distributor: Frank Dyke & Co. Ltd.; US distributor: Beeman's Precision Airguns (formerly Winchester, Hy-Score and others); Standard warranty: 60 months.

The world's largest manufacturer of full-size spring-air guns, with an annual production of 200,000, Mayer & Grammelspacher was founded in 1890 to make airguns, household goods and metalware. The first air pistol appeared in 1892, and by 1914 a dozen different rifles were being manufactured. Further progress was made in the period between the wars, including the development of the ball-sear (c.1937), but production was suspended in 1940. In 1947 the original production machinery, which had been confiscated by the Allies, was sold to Millard Brothers (see page 90), and production did not recommence until 1950. Mayer & Grammelspacher's 'Diana' tradename also passed to Millards, with the result that the German guns are now sold in Britain as 'Originals'. The names 'Geco', 'Gecado' and 'Condor' are also used. The last 30 years have been notable for the development of recoilless airguns incorporating the Giss Contra Piston System (see page 13). Without exception, the company's products offer good quality and performance at competitive prices.

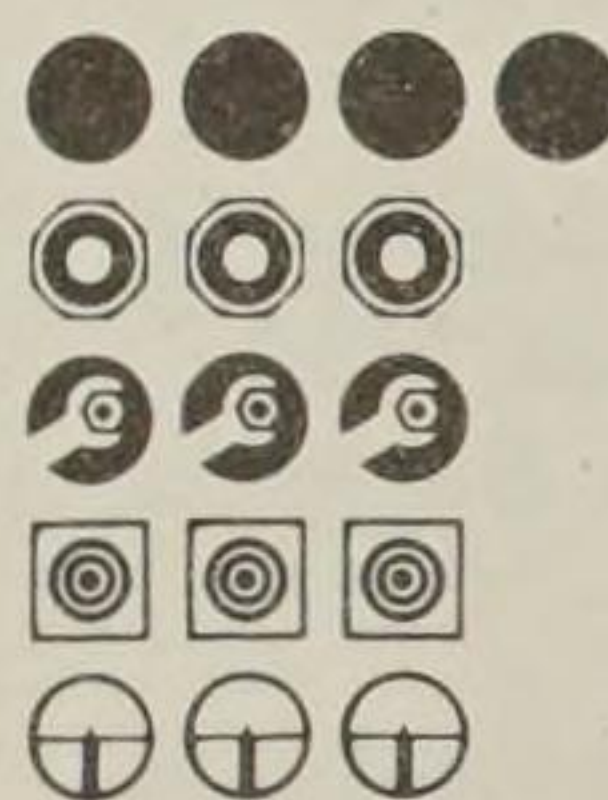
Original Diana LP2

This simple push-in barrel pistol is neither sophisticated nor capable of outstanding performance, as the change in the centre of gravity on firing makes accurate shooting virtually impossible. Cheap, sturdy and quite well made, it is little more than a powerful toy. *Type*, push-in barrel pistol with a rear loading port; *cl*, P5; *cal*, 4.5/0.177; *loa*, 200/7.9 cocked; *bl*, about 185/7.3; *rf*, none; *wt*, 0.30/0.66; *ps*, leather washer; *sft*, none.



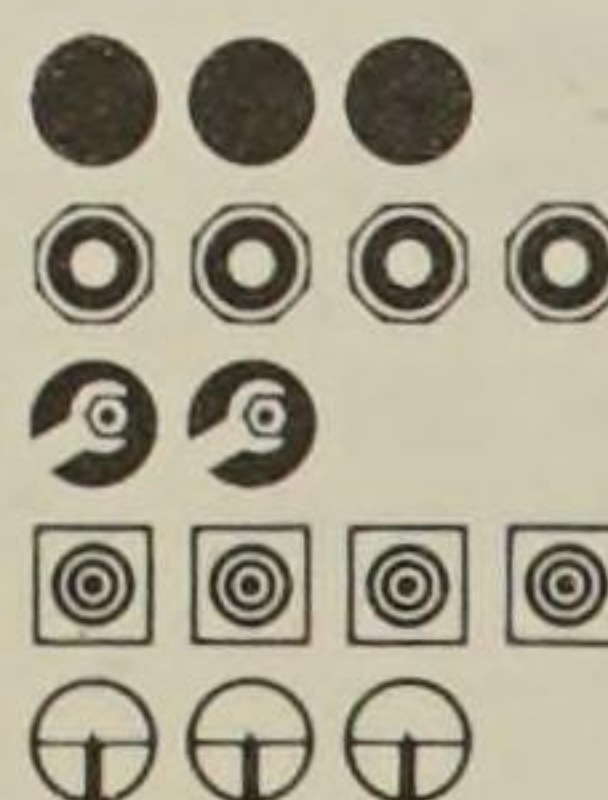
Original Diana LP5

Production of this popular but obsolescent design, dating back to the early 1930s, recommenced in 1956. An injection moulded plastic grip/frame unit, with an integral thumb-rest for right-handed marksmen, replaced wood grips in 1960. The LP5 is reasonably powerful and quite well-balanced, though recoil and spring-surge are quite noticeable. The front sight is a hooded post, while the plastic back sight is a micro-adjustable open pattern with a revolving multi-notch plate. The LP5 was superseded by the LP5G late in 1978. *Type*, break-barrel spring-air pistol, detent-locked (ball); *cl*, C3:P3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 400/15.7; *bl*, 185/7.3; *rf*, 12R; *wt*, 1.10/2.43; *ps*, synthetic washer; *bs*, synthetic O-ring; *sft*, none.



Original Diana LP5G

This, a modernized LP5, appeared in November 1978. It has a new precision-cast alloy frame and separate plastic grips, angled much more obliquely to the bore axis. It also has a new plastic air cylinder cap and a smooth two-stage trigger system, adjustable for travel only. A considerable improvement on the LP5, though the cocking stroke remains quite stiff, the LP5G is a popular beginner's target or sporting pistol. *Type*, break-barrel spring-air pistol, detent-locked (ball); *cl*, C3:P3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 405/16.0; *bl*, 180/7.3; *rf*, 12R?; *wt*, 1.18/2.60; *ps*, synthetic washer; *bs*, synthetic O-ring; *sft*, none.



Original Diana LP6

The LP6, the world's first recoilless spring-air pistol (using the 1956-patented Giss Contra Piston system), attained production status in 1959. Similar to the LP5, it has a double piston and multi-element mainspring assembly. It also has a replaceable-element front sight, though the synthetic back sight remains unchanged, and a plastic grip/frame moulding. The LP6 was superseded by the LP6G in November 1978. *Type*, break-barrel recoilless spring-air pistol, detent-locked (ball); *cl*, C2:P3; *cal*, 4.5/0.177; *loa*, 400/15.7; *bl*, 180/7.3; *rf*, 12R; *wt*, 1.32/2.91; *ps*, synthetic washers; *bs*, synthetic O-ring; *sft*, automatic.

Original Diana LP6G

The LP6G is a modernized LP6, displaying the new cast-alloy frame and comfortable well-raked plastic grips, resulting in a cheap and accurate recoilless pistol much favoured for target shooting. *Type*, break-barrel recoilless spring-air pistol, detent-locked (ball); *cl*, C2:P3; *cal*, 4.5/0.177; *loa*, 405/16.0; *bl*, 180/7.3; *rf*, 12R; *wt*, 1.38/3.04; *ps*, synthetic washers; *bs*, synthetic O-ring; *sft*, automatic.



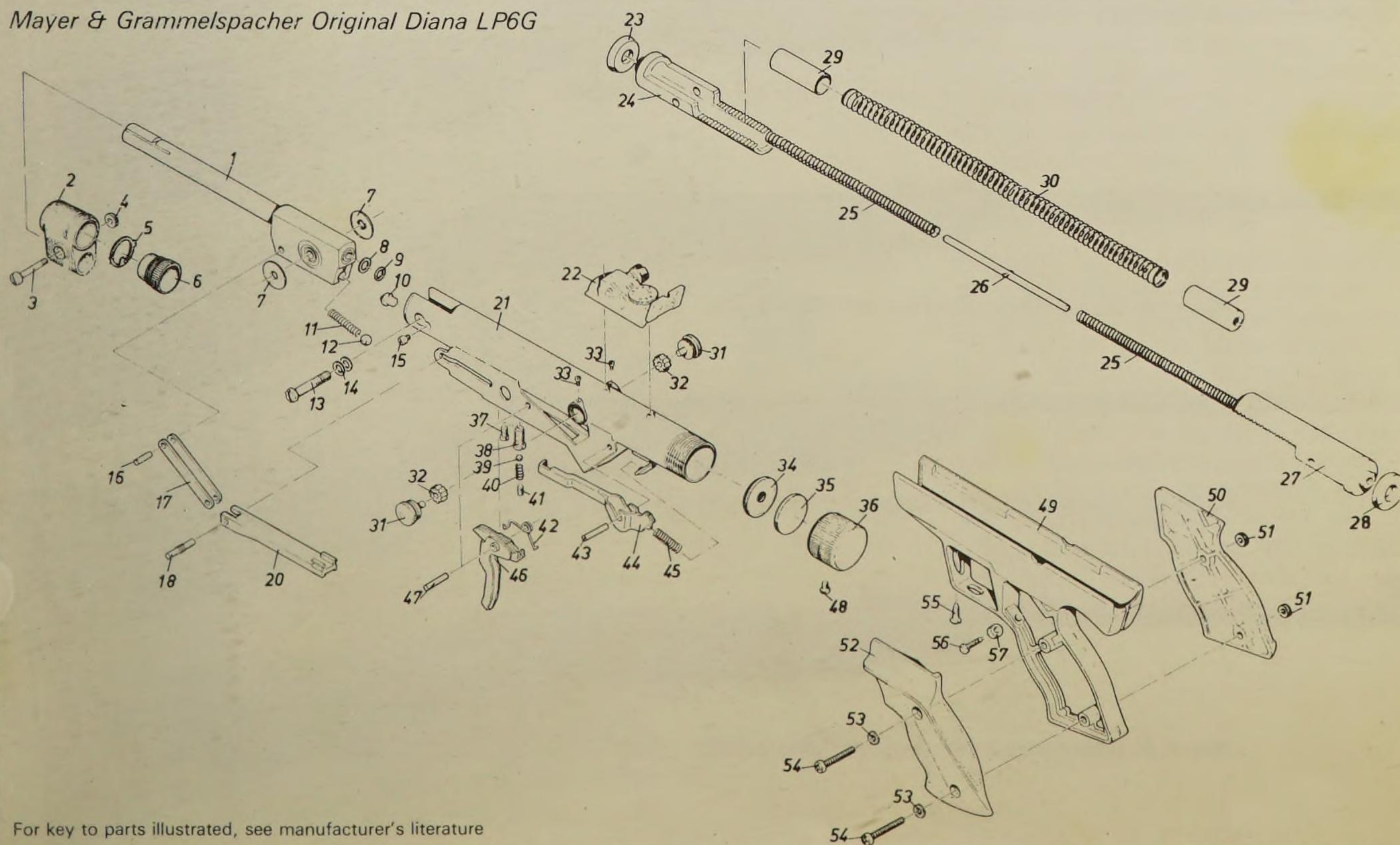


Mayer & Grammelspacher Original Diana LP5G

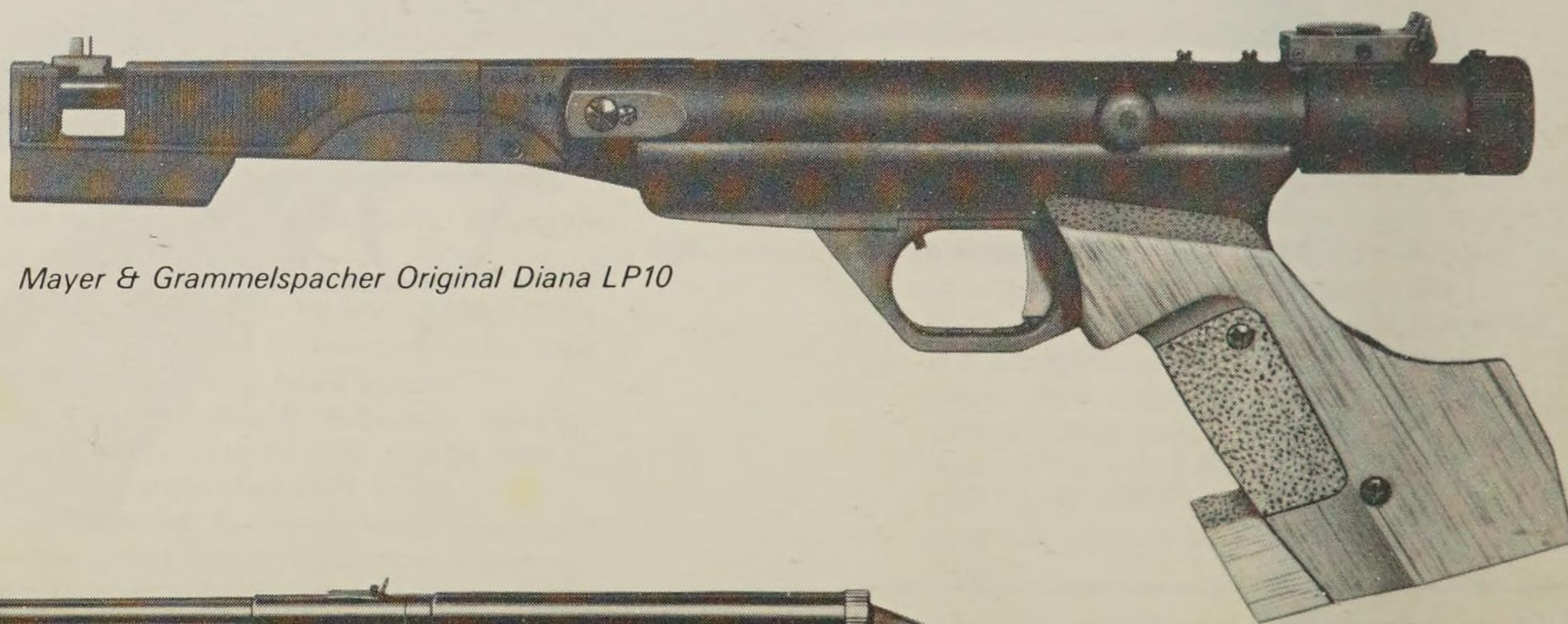
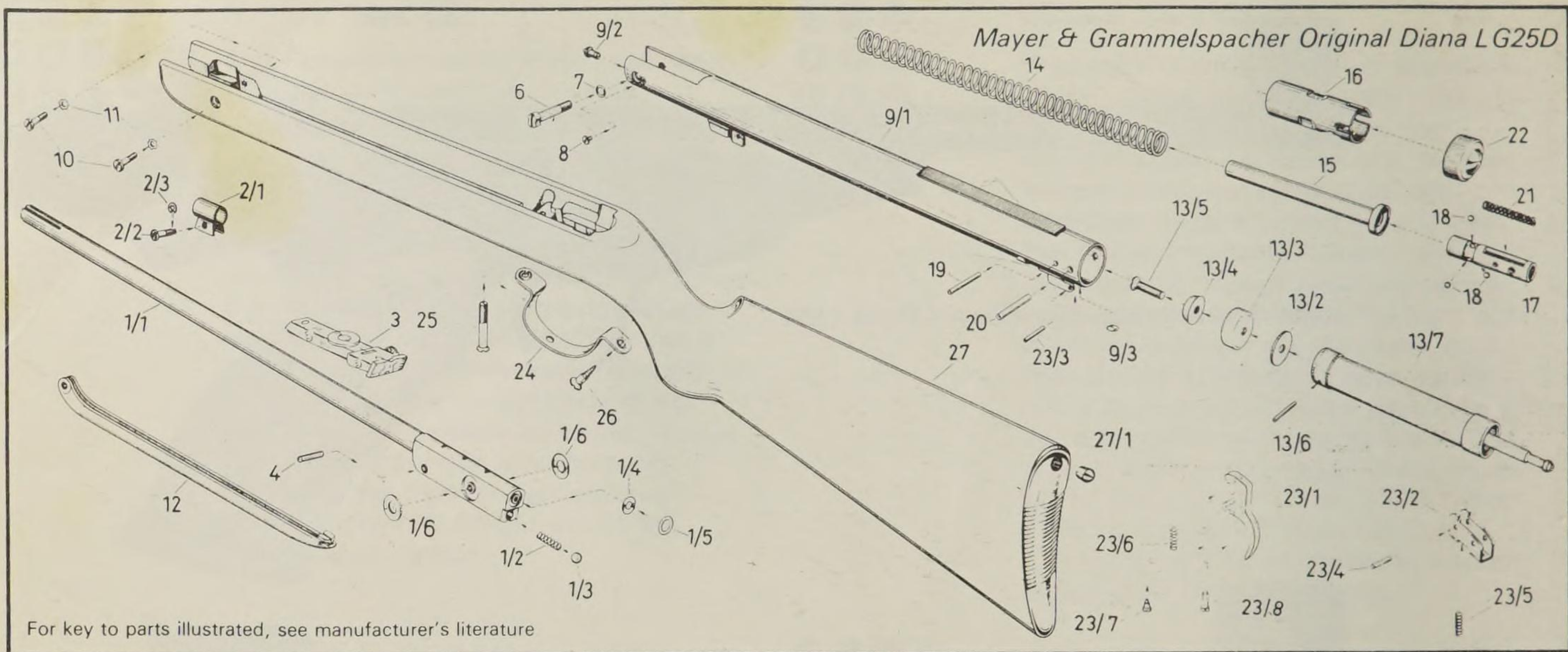


Mayer & Grammelspacher Original Diana LP6G

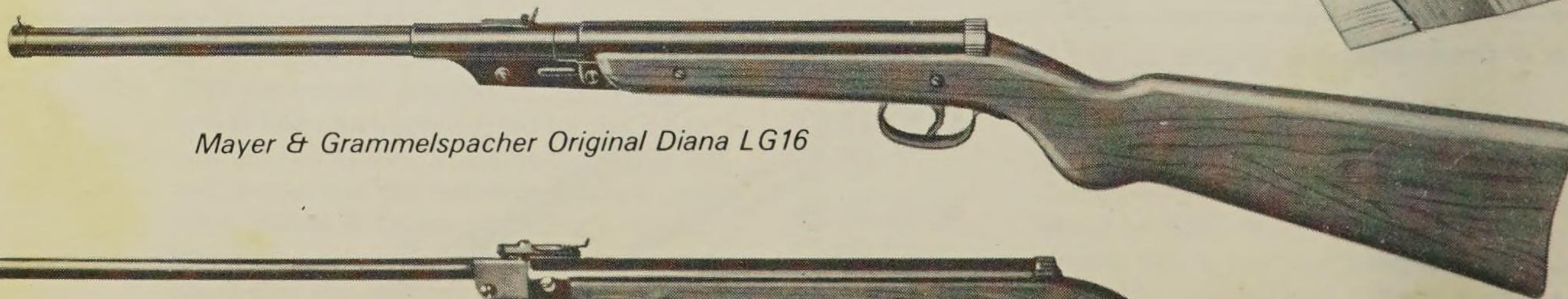
Mayer & Grammelspacher Original Diana LP6G



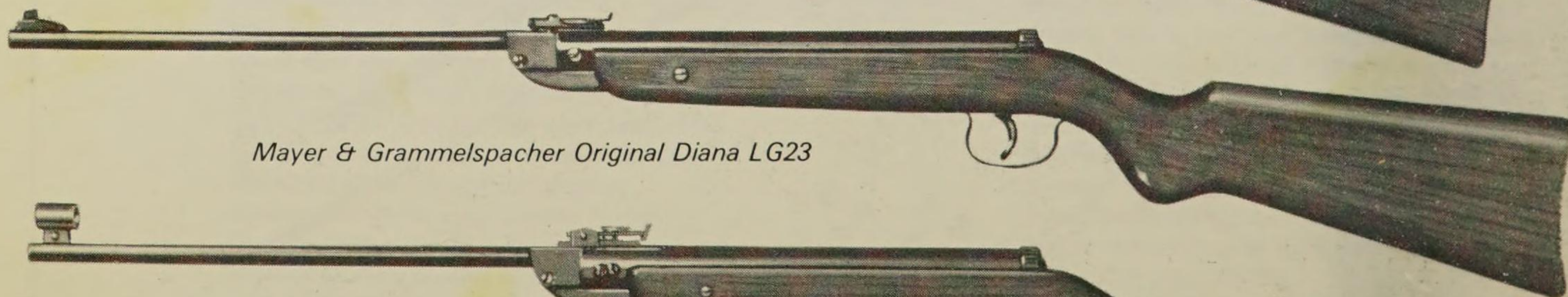
For key to parts illustrated, see manufacturer's literature



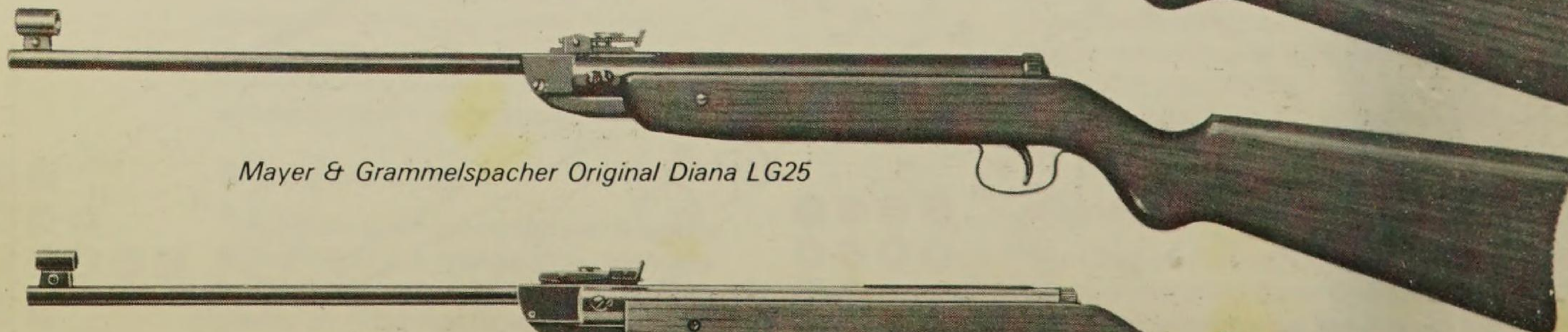
Mayer & Grammelspacher Original Diana LP10



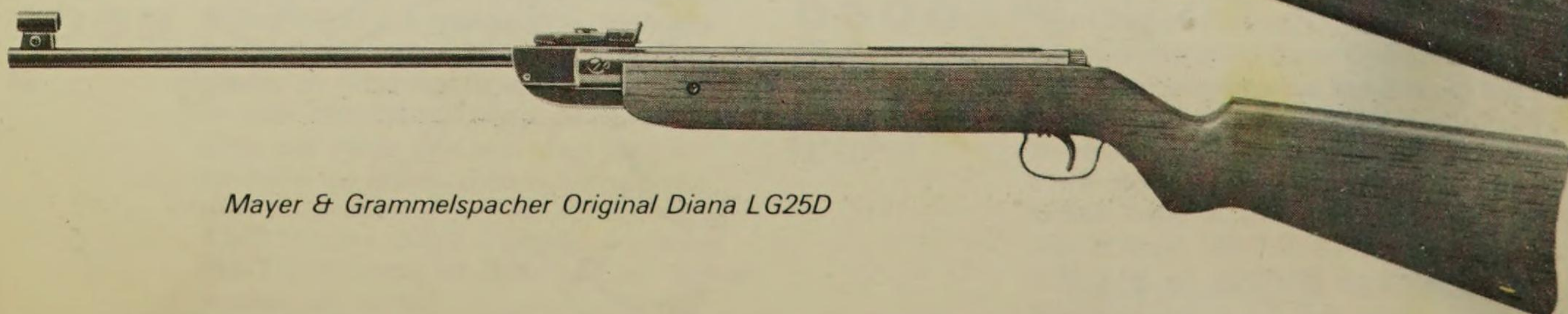
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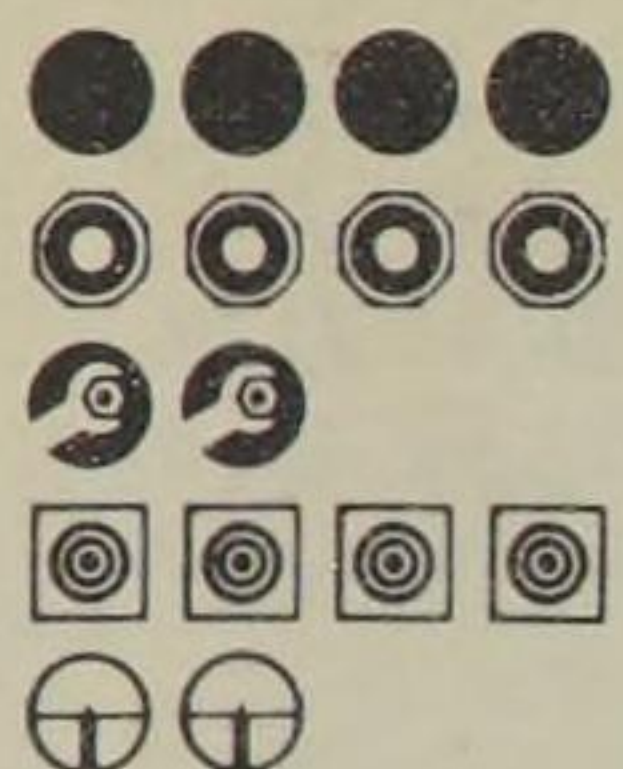
Mayer & Grammelspacher Original Diana LG23



Mayer & Grammelspacher Original Diana LG25

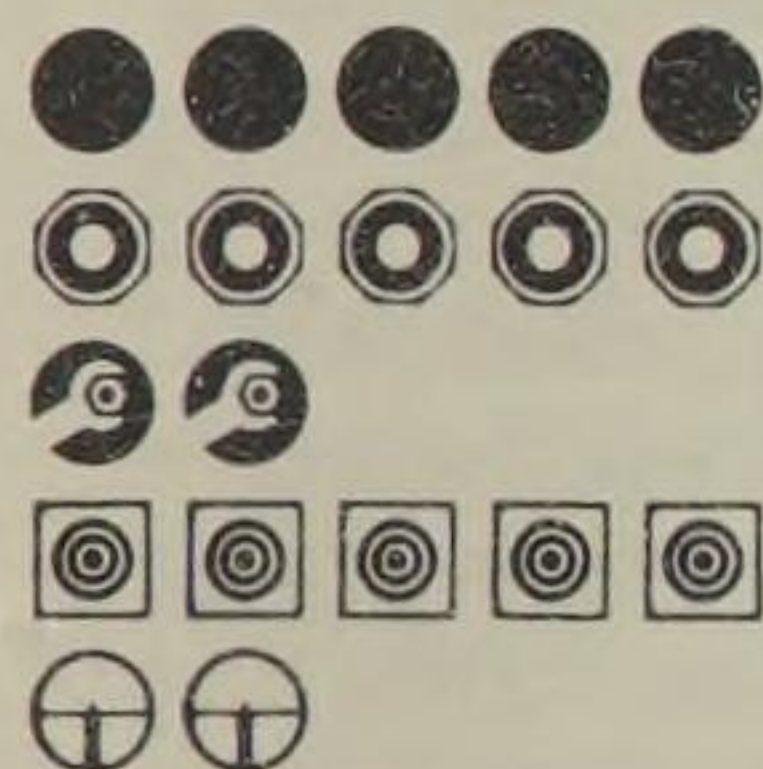


Mayer & Grammelspacher Original Diana LG25D



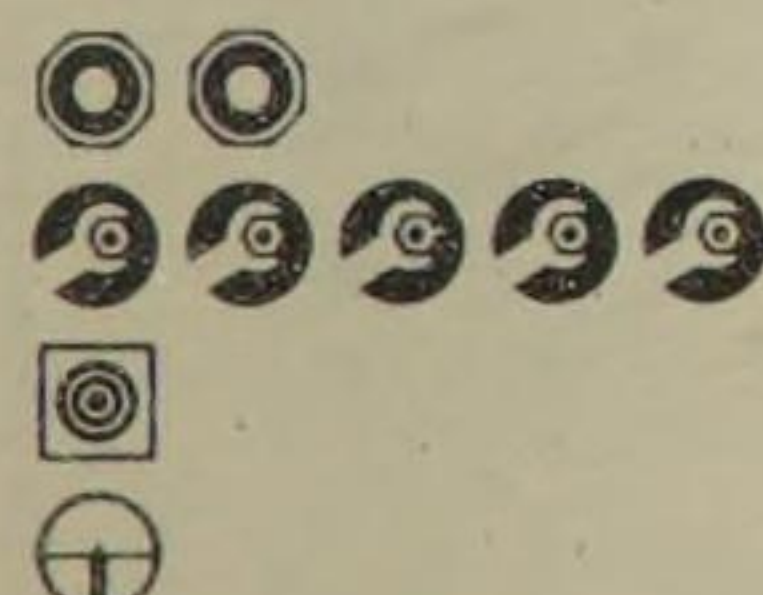
Original Diana LP6M

Because open sights are obligatory in most official competitions, the LP6G has been fitted with the barrel and variable-width front sight unit associated with the LP10. The result looks a little curious, as the phosphated barrel casing contrasts oddly with the blued body and frame, but it is undeniably efficient. See Diana LP6 for details.



Original Diana LP10

One of the few realistic challengers to the Feinwerkbau LP65, the LP10 made its debut in 1975. The proven spring/pneumatic Giss Contra Piston system gives vibration-free firing, while a rotating barrel shroud carries the auxiliary barrel weight and protects the hand during cocking. The fully adjustable walnut palm-rest grips are the finest available. An eccentric adjustable sleeve on the rear of the air cylinder clamps the thumb web, and the excellent trigger system may be adjusted from 0.2 to 1kg (0.4–2.2lb). The micro-adjustable open back sight is complemented by an ingenious rotating post front sight, giving an infinitely variable width between 2.5 and 4mm. An automatic safety in the trigger mechanism prevents piston release while the barrel is open. The phosphated LP10 is very large, but shoots well owing to the virtual absence of recoil and the position of the bore, which is virtually an axial extension of the arm. *Type*, break-barrel recoilless spring-air pistol, detent-locked (ball); *cl*, C1; *cal*, 4.5/0.177; *loa*, 410/16.1; *bl*, 180/7.3; *rf*, 8R; *wt*, 1.49/3.29; *ps*, synthetic washer; *bs*, synthetic O-ring; *sft*, automatic.



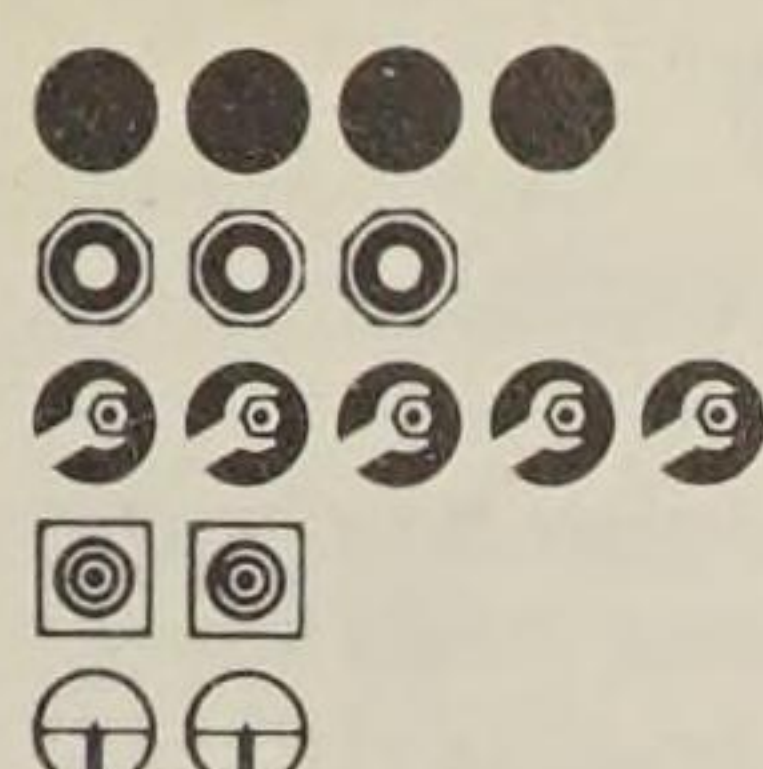
Original Diana LG15

Now discontinued, this survivor of the prewar range is little more than a superior toy. It is distinguished by its cheap, stamped construction, a simple cocking-lever locking bolt, a lightweight barrel inside a thin protective casing, and a non-adjusting two-stage trigger. The sights consist of a fixed bead and a plain open spring-leaf, adjustable vertically. There is a beechwood butt but no fore-end. *Type*, break-barrel spring-air gun; *cl*, R5; *cal*, 4.5/0.177; *loa*, 825/32.5; *bl*, 305/12.0; *rf*, none; *wt*, 1.08/2.38; *ps*, leather washer; *bs*, leather; *sft*, none.



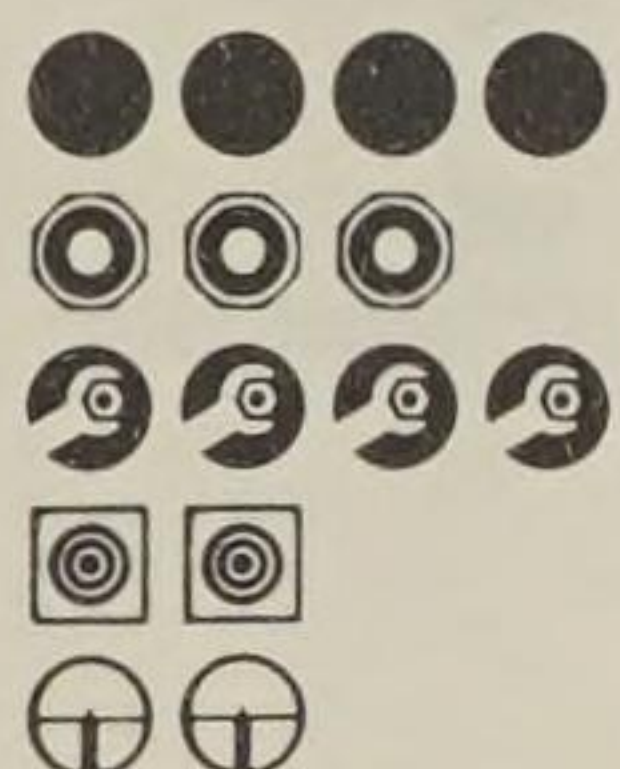
Original Diana LG16

The LG16 has the action of the LG15 combined with a conventional pistol-gripped beech stock. It may still be obtained. *Type*, break-barrel spring-air gun; *cl*, R5; *cal*, 4.5/0.177; *loa*, 840/33.1; *bl*, 305/12.0; *rf*, none; *wt*, 1.21/2.67; *ps*, leather washer; *bs*, leather; *sft*, none.



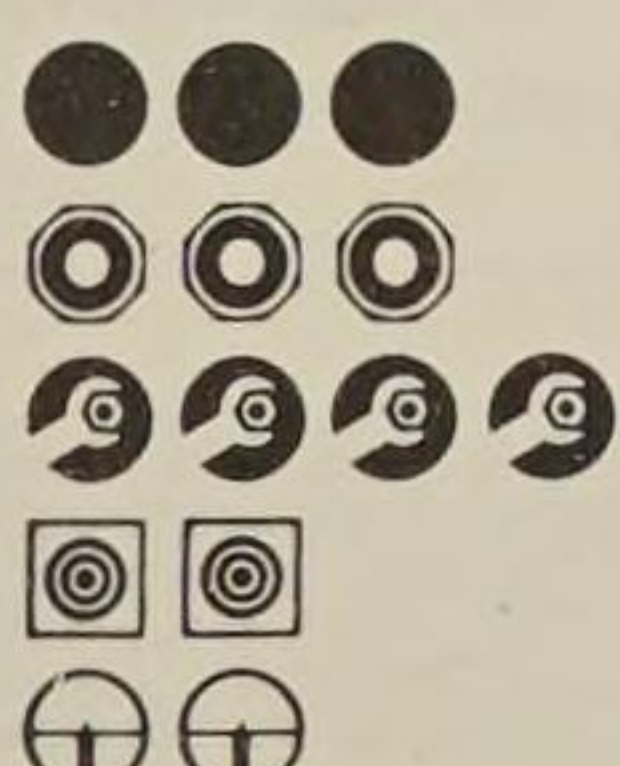
Original Diana LG22

This small but very conventional design has central piston release, a non-adjusting two-stage trigger and simple LG15/16-type sights. Its construction follows traditional solid gunsmithing methods. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R5/R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 915/36.0; *bl*, 355/14.0; *rf*, optional 8R/12R; *wt*, 1.72/3.79; *ps*, leather washer; *bs*, leather; *sft*, none.



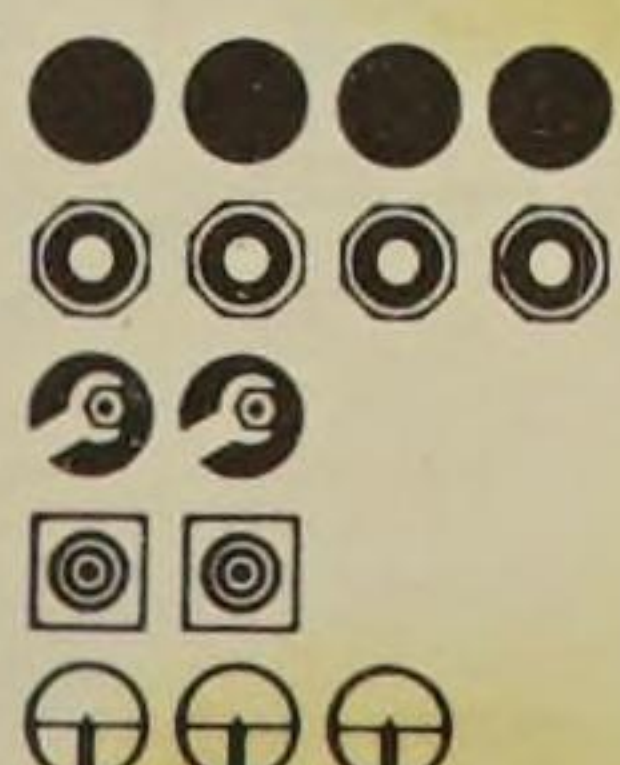
Original Diana LG23

This popular, cheap, beginner's gun is a minor variant of the LG22, sharing identical mechanical characteristics. It has a barleycorn front sight and an elevating spring-leaf back sight, though there are no mounting rails for a telescope or aperture sight. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R5/R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 915/36.0; *bl*, 355/14.0; *rf*, optional 8R/12R; *wt*, 1.93/4.26; *ps*, leather washer; *bs*, leather; *sft*, none.



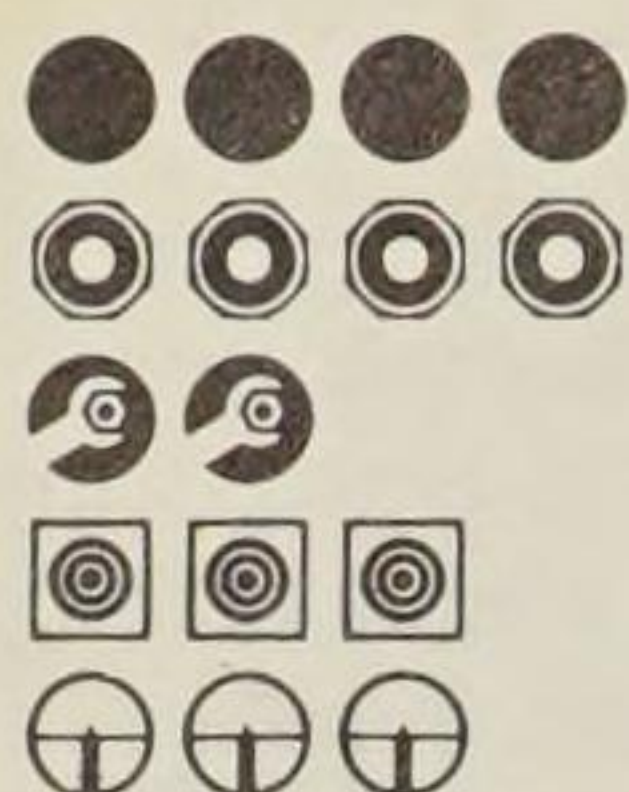
Original Diana LG25

A popular, well made junior or intermediate rifle, derived from the LG22, the LG25 displays a hooded blade front sight and the standard metal micro-adjustable back sight (newer guns only). Though it incorporates few mechanical refinements, it is the first rifle in this series to feature a lock-screw for the barrel pivot bolt. The Condor Model 226, made in small numbers in the late 1970s, was an LG25 with a heavier barrel and a more robust squared stock. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 965/38.0; *bl*, 400/15.7; *rf*, optional 8R/12R; *wt*, 2.27/5.01; *ps*, leather washer; *bs*, leather; *sft*, none.



Original Diana LG25D

Externally similar to the LG25, the LG25D has a ramp for telescope or aperture (Dioptervisier) sights. It also incorporates the patented ball-sear piston release system, developed for the LG35, and a two-stage adjustable-travel trigger. It is more expensive than the standard LG25, but the better trigger system is an undoubted improvement. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R4; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 965/38.0; *bl*, 400/15.7; *rf*, optional 8R/12R; *wt*, 2.44/5.38; *ps*, leather washer; *bs*, leather; *sft*, none.



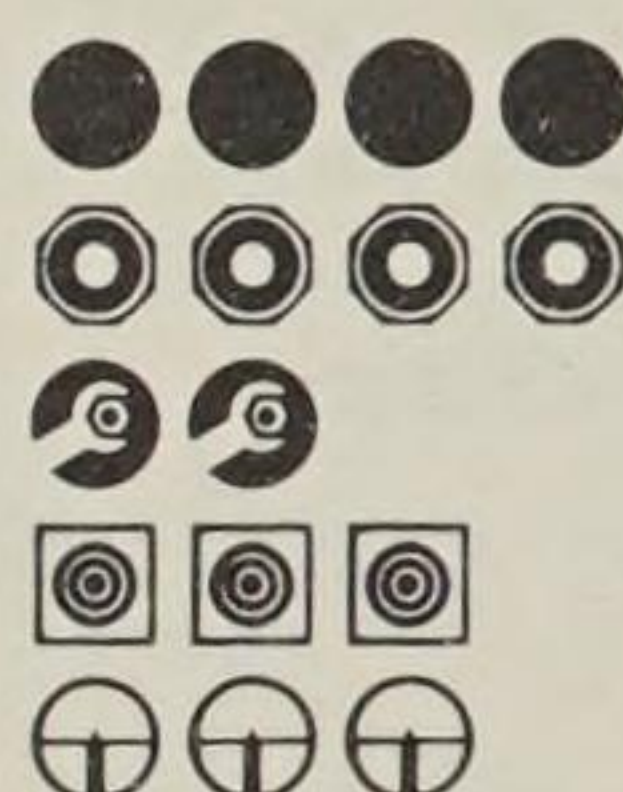
Original Diana LG25DS

This improved 25D, sharing the matted-rib sight ramp and ball-sear trigger system, also incorporates an automatic trigger-blocking safety to prevent piston release while the barrel is open. The cocking lever is articulated, the modified stock has a rubber butt-plate and an ivory-colour spacer, and the trigger guard is a very distinctive squared stamped strip. The rifle is quite an advanced design for its class. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 980/38.6; *bl*, 400/15.7; *rf*, 12R; *wt*, 2.50/5.51; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.



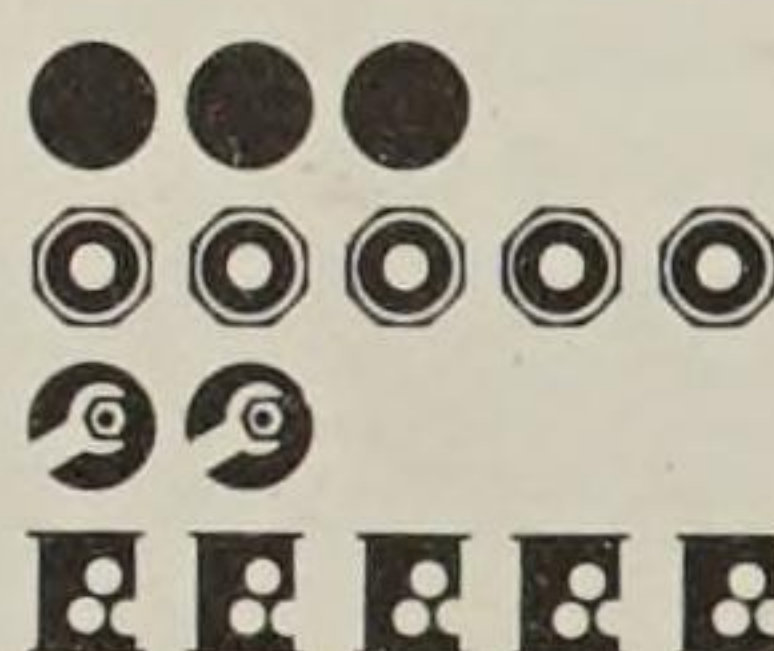
Original Diana LG27

Another of the M&G airguns with prewar origins, the current LG27 is an enlarged 25D, sharing similar mechanical characteristics, including the ball-sear trigger unit. A telescope or aperture sight may be fitted on the above-receiver ramp. The Condor Model 228, dating from the late 1970s, was a short-lived variant of the LG27 with a heavier barrel and a revised square-



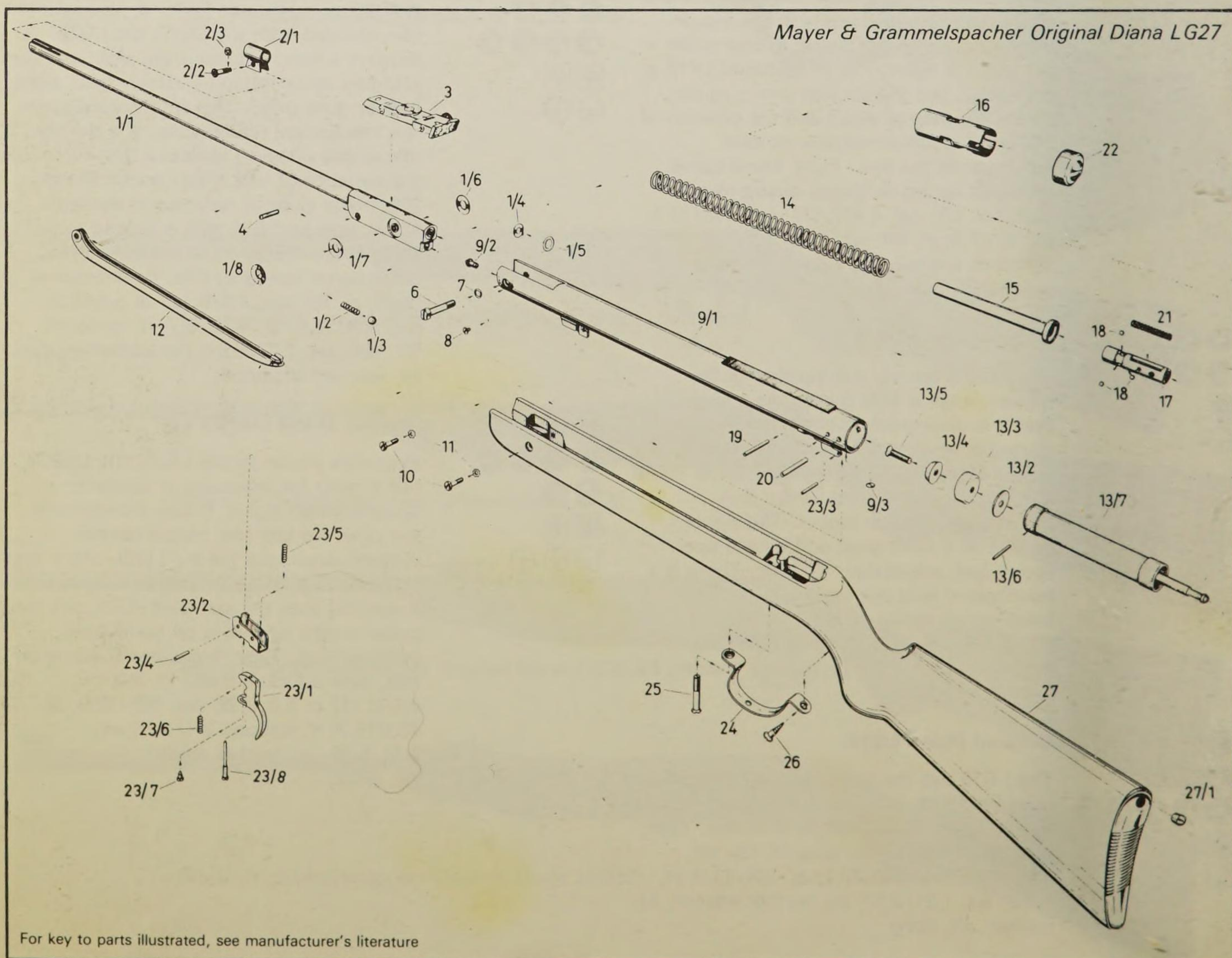
Original Diana LG27S

The 'Super' version of the LG27 has an articulated cocking-lever system, an automatic trigger-blocking safety, the modified stock with the rubber butt-plate and ivory plastic spacer, and the squared trigger guard. It is well made, but expensive in its class; it does, however, have some very good features. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,080/42.5; *bl*, 440/17.3; *rf*, 8R/12R; *wt*, 2.82/6.22; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.

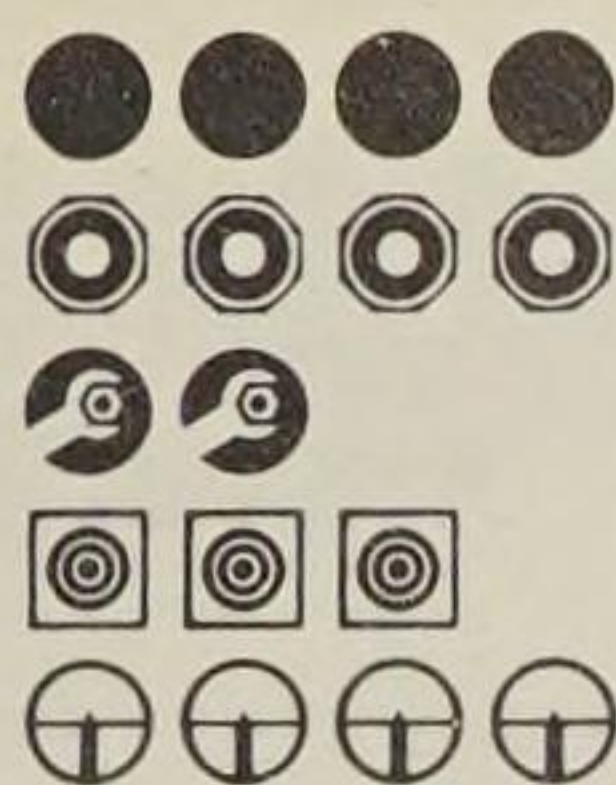


Original Diana LG30

The curious LG30 is fitted with automatic counting devices, and is intended for shooting galleries. It has good safety features and a single-stroke autoloading mechanism based on the Haenel



Sportmodell of 1933, though the bolt lies well forward over the fore-end rather than immediately in front of the trigger. The back sight is adjustable, while the metal parts all have a grey phosphate finish. *Type*, bolt-action fixed-barrel repeating BB gun; *cl*, R5; *cal*, 4.40/0.175 ball; *loa*, 1,100/43.3; *bl*, 570/22.4; *rf*, none; *wt*, 3.30/7.28; *s*, synthetic; *sft*, manual and automatic; *mag*, tube, 125-shot.



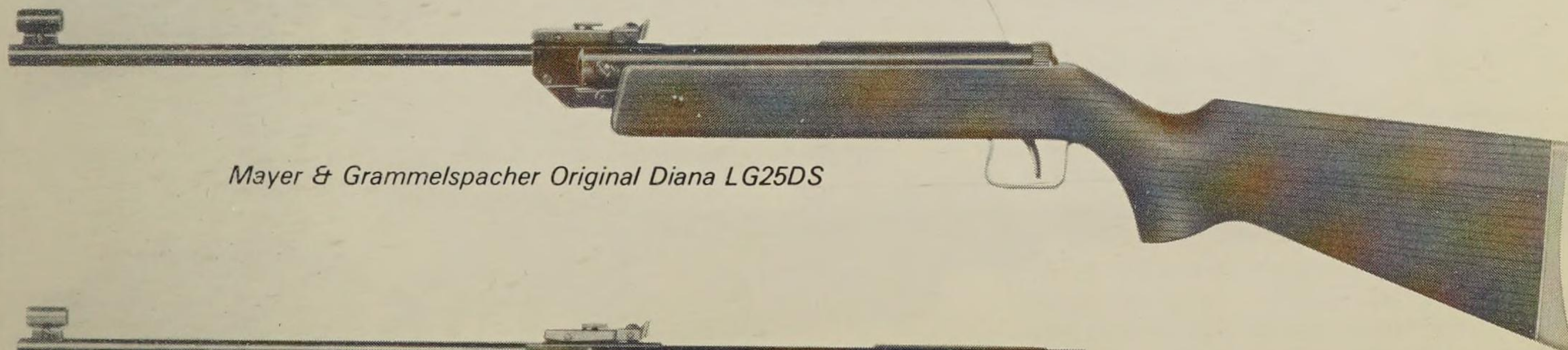
Original Diana LG35

Among the best known and widest distributed of the Mayer & Grammelspacher airguns, the current version of the adult-size LG35 is virtually identical with the LG25D and 27, with the patented ball-sear piston release system. Detail improvements will be found in the trigger, the piston unit and the beech stock, however. The butt has rolled-in pistol grip chequering, a cheekpiece and an ivory-colour spacer. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R2/R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,125/44.3; *bl*, 485/19.1; *rf*, optional 8R/12R; *wt*, 3.28/7.23; *ps*, leather washer; *bs*, leather or synthetic O-ring; *sft*, none.

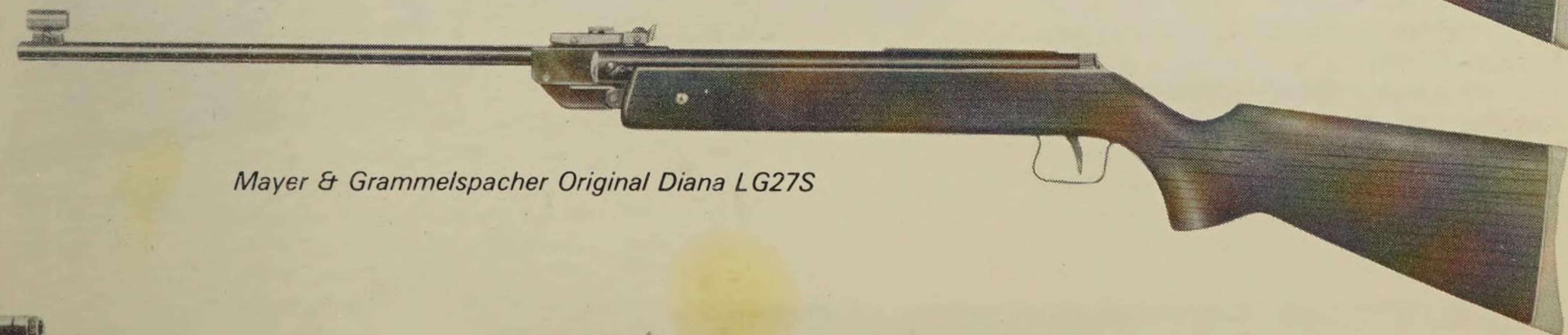


Original Diana LG35S

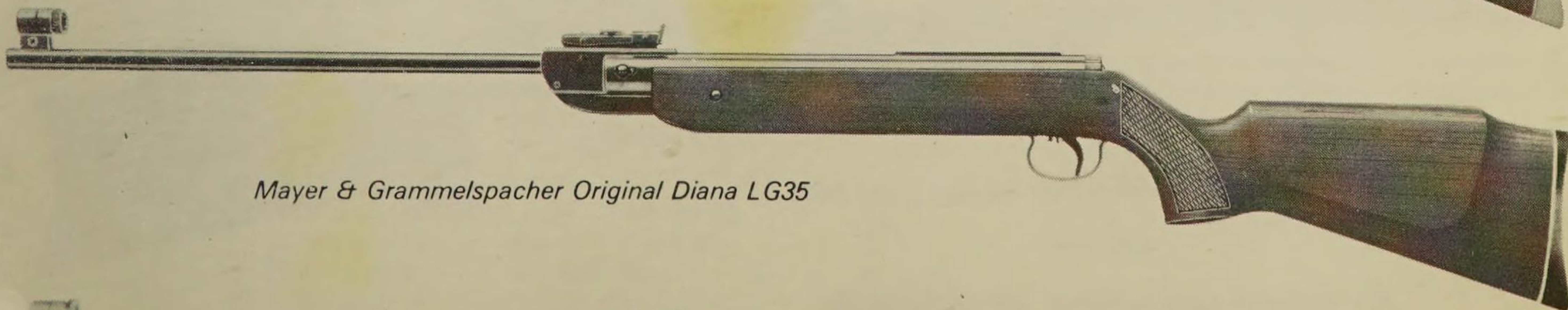
The LG35 'Super' dates from 1977. It retains the ball-sear system, giving a crisp and positive – though non-adjustable – trigger pull, factory set anywhere between 2 and 4lb (0.9 – 1.8kg). The cocking lever is articulated and an automatic trigger-blocking safety prevents piston release until the barrel is virtually closed. The well finished angular beech stock, less elegant than its forerunner, has a well defined pistol grip and cheekpiece; it also has an effective ventilated rubber butt-plate, the currently fashionable deep square-cut fore-end, a rather unattractive squared stamped-strip trigger guard and a curious chequered plate inlet on either side of the grip. The result is reasonable performance and handling at a competitive price. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R2/R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,130/44.5; *bl*, 485/19.1; *rf*, 8R/12R; *wt*, 3.63/8.00; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.



Mayer & Grammelspacher Original Diana LG25DS



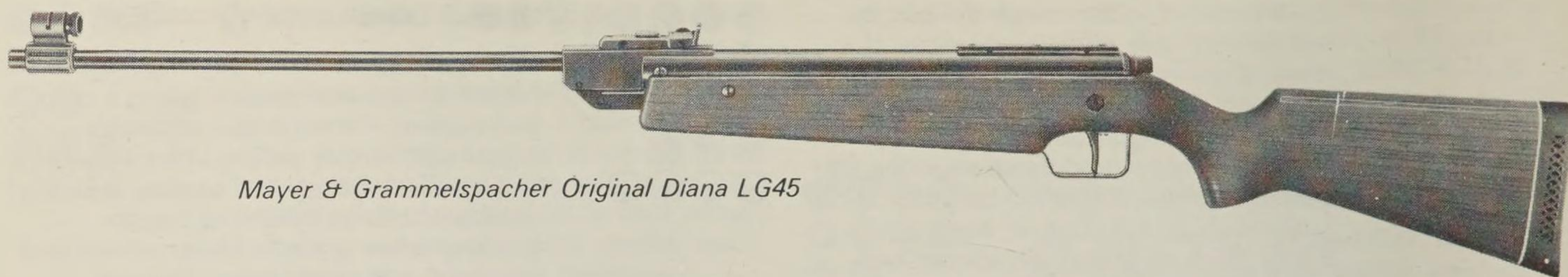
Mayer & Grammelspacher Original Diana LG27S



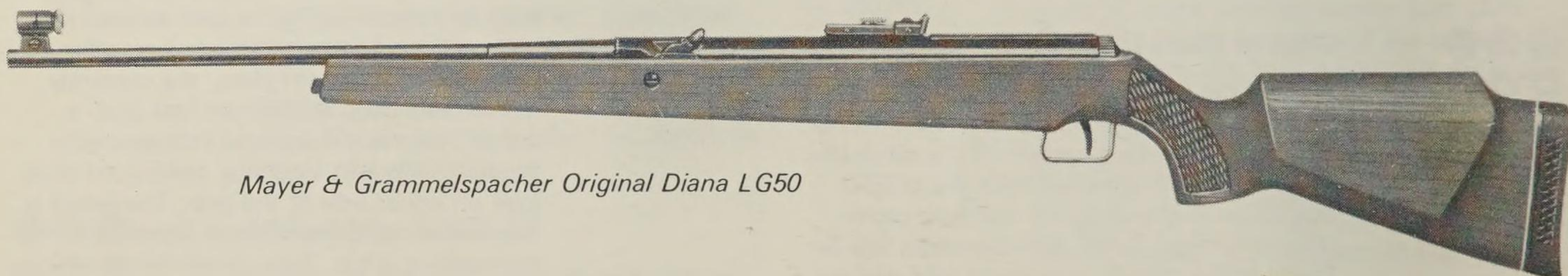
Mayer & Grammelspacher Original Diana LG35



Mayer & Grammelspacher Original Diana LG35S



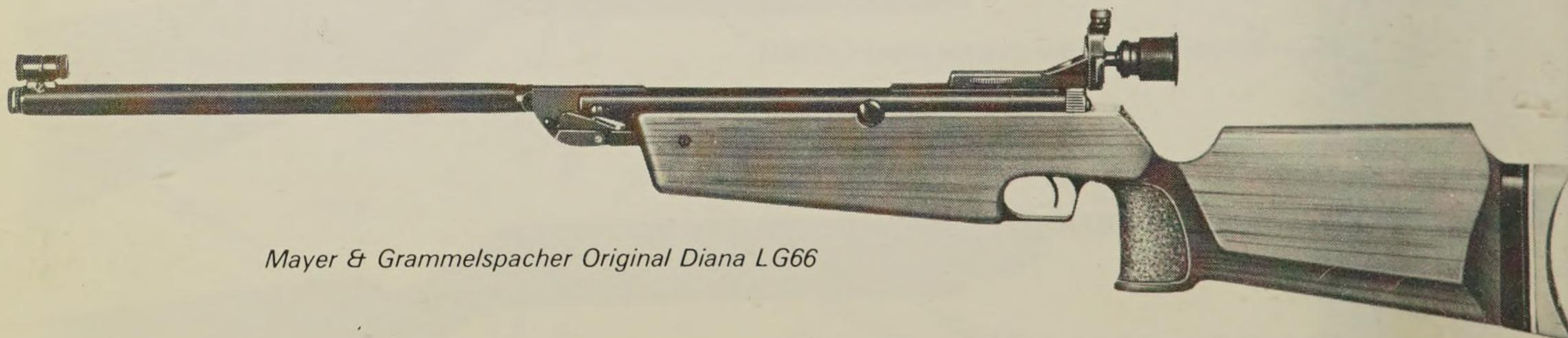
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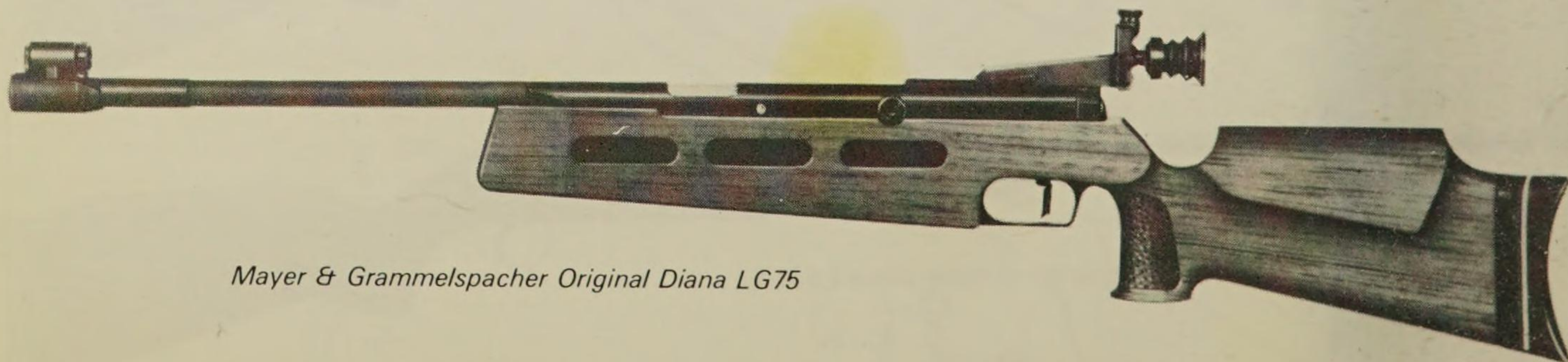
Mayer & Grammelspacher Original Diana LG50



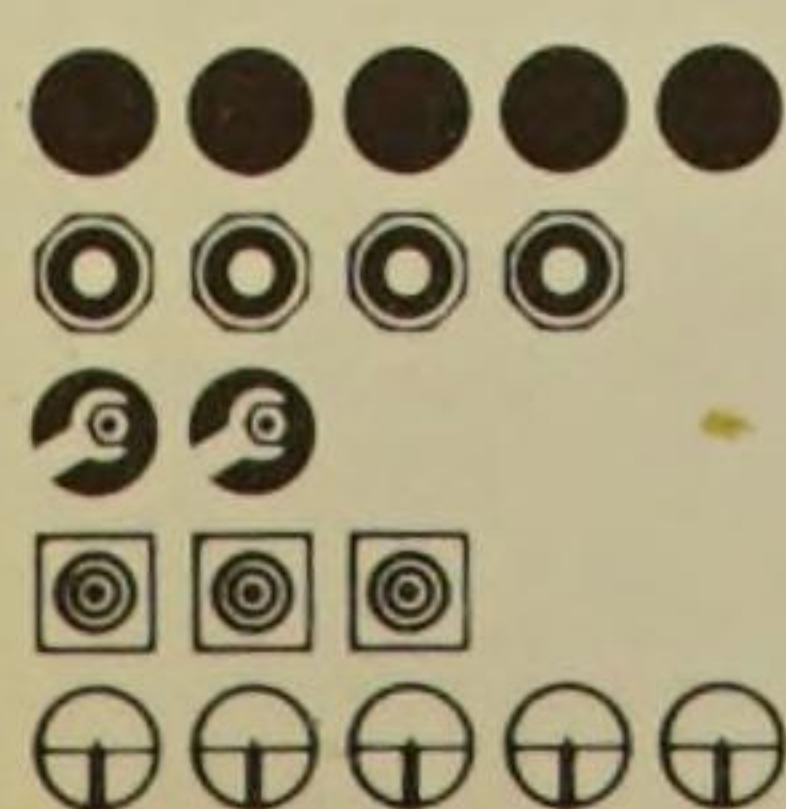
Mayer & Grammelspacher Original Diana LG60



Mayer & Grammelspacher Original Diana LG66



Mayer & Grammelspacher Original Diana LG75

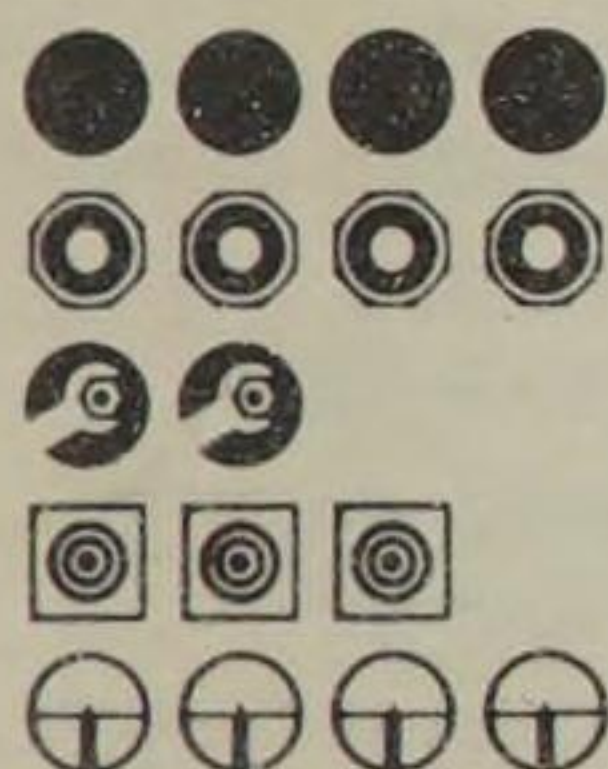


Original Diana LG45

The powerful '45', capable of exceeding 800fs (245ms) and 600fs (185ms) with some types of 4.5/0.177 and 5.5/0.22 pellets respectively, is a complete departure from the 35S. Though the back sight and a few other components have been retained, the ball-sear has been replaced with a conventional (but complicated) adjustable

trigger system. This includes a sliding semi-automatic safety which protrudes from the back of the cylinder when the gun is cocked, displaying a white encircled S in the aperture at the rear left of the receiver, and must be reset manually — displaying a red dot — before each shot. The markings are only visible on the left. (The first few

guns had troublesome sears and safety slides, but the problems were speedily cured. They lack the safety aperture and markings.) The rifle has a one-piece cocking lever and a well made plain beech stock. Rather surprisingly, it lacks a cheekpiece, though it is suited equally to right- or left-handed owners. The efficient ventilated rubber butt-plate is accompanied by a thin ivory-colour spacer. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R2/R1; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,155/45.5; *rf*, 8R/12R; *wt*, 3.62/7.98; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, semi-automatic.



Original Diana LG50

This elegant underlever-cocker was the first new design to be made after the recommencement of production in 1950. The mechanism is housed in the distinctive threequarter-length stock, though the linkage lacks the compact excellence of the BSA Airsporters. The LG50 shares the ball-sear and sights of the LG35, but has a longer sight radius. Current guns have a distinctly powerful and massive appearance owing to the new deep fore-end stock, though the older design – lighter, slimmer and with a schnabel fore-end tip – was undoubtedly more elegant. (NB: the power of the mainspring was allegedly increased from gun 173010, but published velocity figures are contradictory.) *Type*, fixed-barrel underlever-cocking spring-air rifle, loaded through a rotary port; *cl*, R2/R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,140/44.9; *bl*, 495/19.5; *rf*, 12R; *wt*, 3.68/8.11; *ps*, leather washer; *sft*, automatic (new guns only).



Original Diana LG60

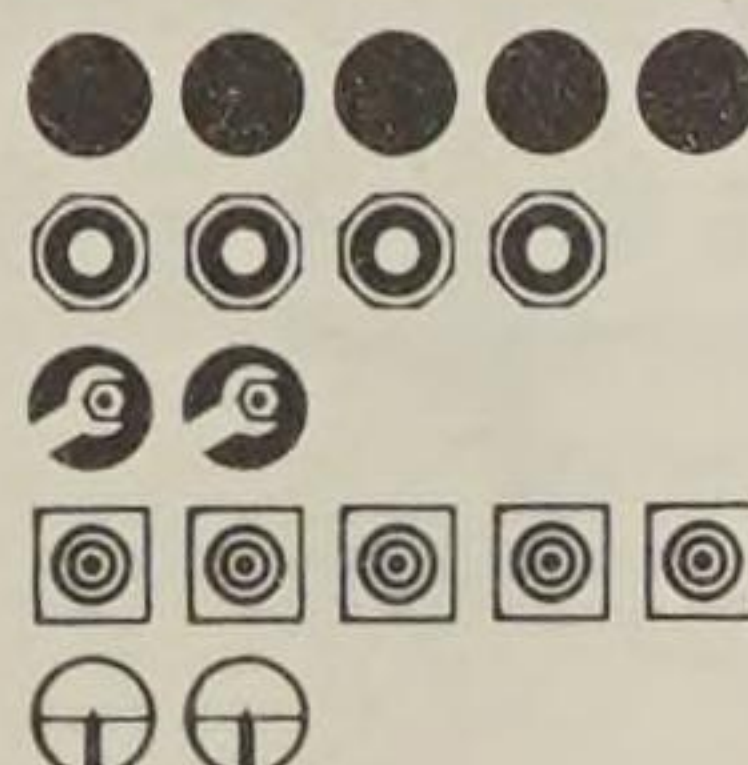
This recoilless rifle, displaying the Contra Piston system developed by Kurt Giss for the LP6 in 1955–56, appeared in 1960. Its two identical opposing pistons, driven by a common mainspring assembly, neutralize each other's momentum. The LG60 has aperture sights, a barrel sleeve weight and an effective automatic safety blocking the trigger as the barrel opens. The trigger may be adjusted for pull-weight, travel and let-off point, while the oil-finish walnut stock – with a deep rounded fore-end – has a neatly chequered pistol grip and a vertically adjustable butt-plate. *Type*, break-barrel recoilless spring-air rifle, detent-locked (ball); *cl*, M2; *cal*, 4.5/0.177; *loa*, 1,085/42.7; *bl*, 455/17.9; *rf*, 8R/12R; *wt*, 4.43/9.77; *ps*, synthetic washers; *bs*, synthetic O-ring; *sft*, automatic.



Original Diana LG65

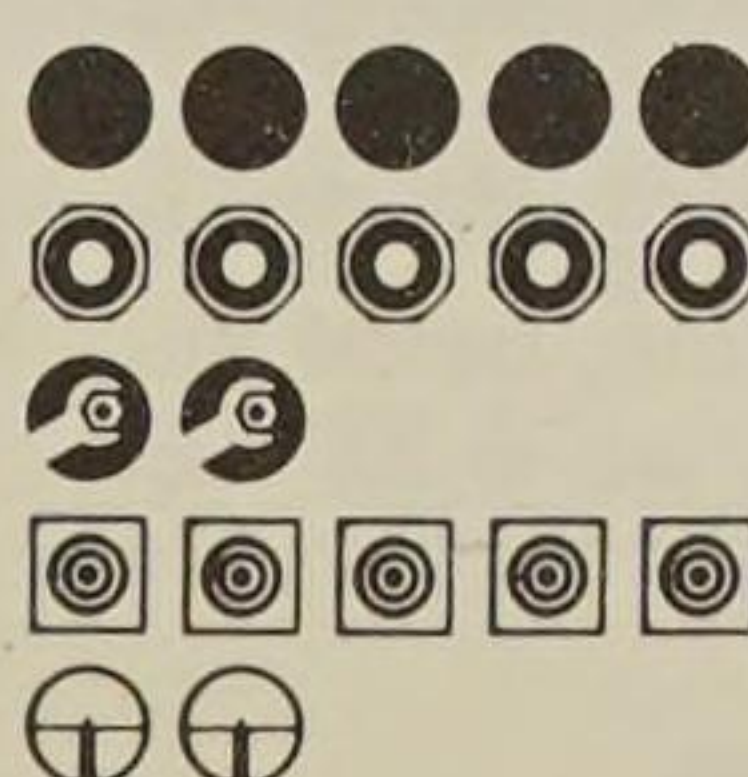
A heavier LG60, this gun incorporates a positive barrel lock actuated by a radial lever on the left side of the barrel block. Horizontal when locked, the lever pivots upward to release the breech-bolt and will

counteract wear in the barrel joint. The LG65, which had a rounded stock, was speedily superseded by the LG66. *Type*, break-barrel recoilless spring-air rifle, with positive barrel lock; *cl*, M1/M2; *cal*, 4.5/0.177; *loa*, 1,085/42.7; *bl*, 455/17.9; *rf*, 12R; *wt*, 4.60/10.14; *ps*, synthetic washers; *bs*, synthetic O-ring; *sft*, automatic.



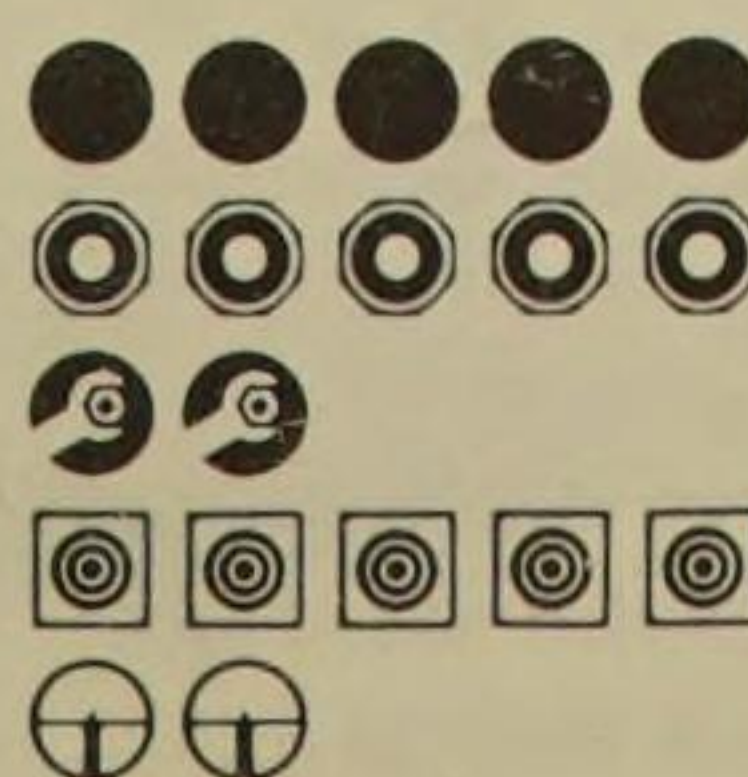
Original Diana LG66

The perfected M&G recoilless break-barrel competition rifle remains the leading design of its type, surpassed only by the leading recoilless sidelever cockers and, perhaps, the Walther LGV Spezial. It shares the adjustable trigger, sights, safety, barrel sleeve and lock of the LG65. However, its stock has a deep squared butt and fore-end, with extensive stippling on the pistol grip, and a vertically adjustable rubber butt-plate. The LG66 has always been very attractively priced, but has suffered the ill-merited prejudice common to all break-barrel guns. *Type*, break-barrel recoilless spring-air rifle, with positive barrel lock; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,100/43.3; *bl*, 455/17.9; *rf*, 12R; *wt*, 4.82/10.63; *ps*, synthetic washers; *bs*, synthetic O-ring; *sft*, automatic.



Original Diana LG75

Introduced in 1977, the LG75, a recoilless design using the Giss Contra Piston system, is now beginning to make an impact at the highest level. It is truly recoilless, though extremely complicated, and has a very special adjustable trigger mechanism; the trigger lever, for example, can be adjusted longitudinally and laterally to suit the firer. It has an unusual infinitely variable aperture front sight, while the back sight is the standard Model 75 type. The deep squared oil-finish walnut stock has three shallow cutaways on each side to give maximum fore-end depth while conserving weight, contrasting attractively with the blued receiver and non-reflective phosphated barrel. The vertically-adjustable butt-plate is canted towards the firer's shoulder; right- or left-hand actions and stocks are available. *Type*, fixed-barrel sidelever cocking recoilless rifle, direct barrel loading; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,110/43.7; *bl*, 480/18.9; *rf*, 8R; *wt*, 4.94/10.89; *ps*, synthetic washers; *bs*, synthetic; *sft*, automatic.



Original Diana LG75HV

This minor variant of the standard LG75 has a higher sight line (höhere Visierlinie) resulting from an additional lifting block under the back sight and a higher front sight base. The adjustable-height cheekpiece is suitable for 'head-up' or multi-positional shooting. See LG75 for details.

MILBRO

Millard Brothers Ltd., PO Box 24, Motherwell, Lanarkshire ML1 4UP, Scotland. US distributor: none (formerly Marksman Products); Standard warranty: 12 months.

This business dates from 1887, when it was founded by Oliver and Samuel Millard in Stockwell Road, London SW. Incorporation occurred in 1900. In 1926 the firm moved to Caledonian Road, London N7, where fishing tackle, guns, and camping equipment were made and sold. Machinery formerly owned by Mayer & Grammelspacher (see page 82) was acquired in 1947, and two years later the Carfin Works in Motherwell opened. That year, the first of the spring-air Dianas was manufactured. Millards – which joined the Grampian Group in 1961 – also acts as UK distributors for several other companies, including Daisy.

Milbro Diana G2/5

This is a modernized version of the Model 2 of 1949. Introduced in 1965, it is a sturdy but unsophisticated gun with oxidized metalwork, simple fixed blade and V-notch sights, and moulded plastic grips. It handles better than many of its type. *Type*, push-in barrel spring-air pistol, loaded through rear port; *cl*, P5; *cal*, 4.5/0.177; *loa*, barrel in, 202/7.95; *bl*, N/A; *rf*, none; *wt*, 0.32/0.69; *ps*, leather washer; *sft*, none.

Milbro Diana G3/1 (or SP50)

This modernized G2/5, dating from 1972, has a cast frame/receiver resembling a semi-automatic pistol. The finish is matt black. *Type*, push-in barrel spring-air pistol, loaded through rear port; *cl*, P5; *cal*, 4.5/0.177; *loa*, barrel in, 205/8.07; *bl*, N/A; *rf*, none; *wt*, 0.69/1.51; *ps*, leather washer; *sft*, none.

Milbro G5/1 and G5/2 Cougar

The large but not especially powerful Cougar appeared in 1978. Although mechanically unsophisticated, the Cougar is exceptionally well packaged and has interesting futuristic lines. The moulded ABS (Acrylonitrile-Butadiene-Styrene) fore-end envelops the barrel block and a large ABS grip unit has a comfortable thumb-rest for right-handed marksmen. The glass-filled nylon barrel extension makes cocking easier, while positioning the fully adjustable back sight on the rear of the air cylinder gives the longest possible sighting radius. The rear of the frame displays the mounting rails for the rather fragile skeletal shoulder stock, locked by an ingenious sliding synthetic collar. A telescope sight may be attached by means of the optional plastic sight bracket, replacing the back sight rail. The Cougar is excessively heavy for offhand

pistol shooting, and the back sight lies a little too near to the eye with the stock fitted. The trigger pull is also rather stiff. However, the G5 is very competitively priced and entertaining to use. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, P3; *cal*, 4.5/0.177 (G5/1), 5.5/0.22 (G5/2); *loa*, 474/18.7 or 715/28.2 with stock; *bl*, 220/8.7; *rf*, 8R; *wt*, 1.86/4.10 or 2.03/4.48 with stock; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

Milbro Diana G76/1 and G76/2

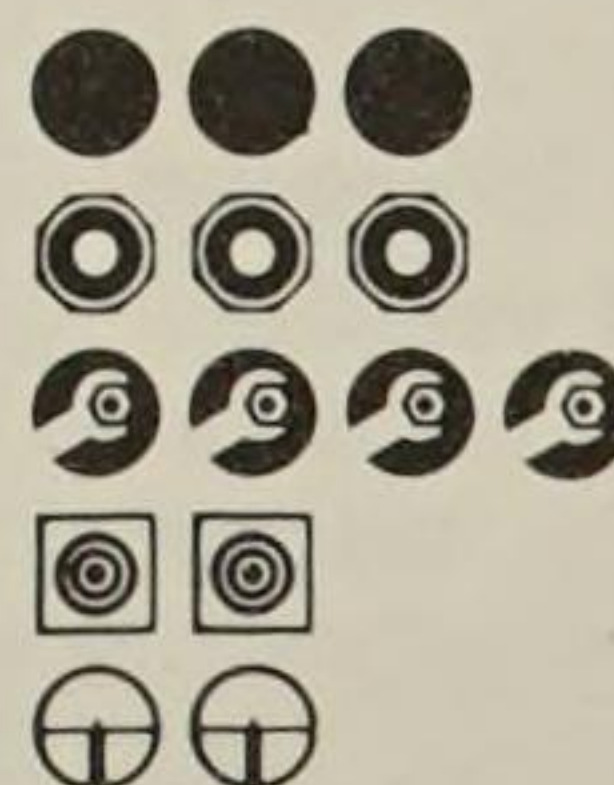
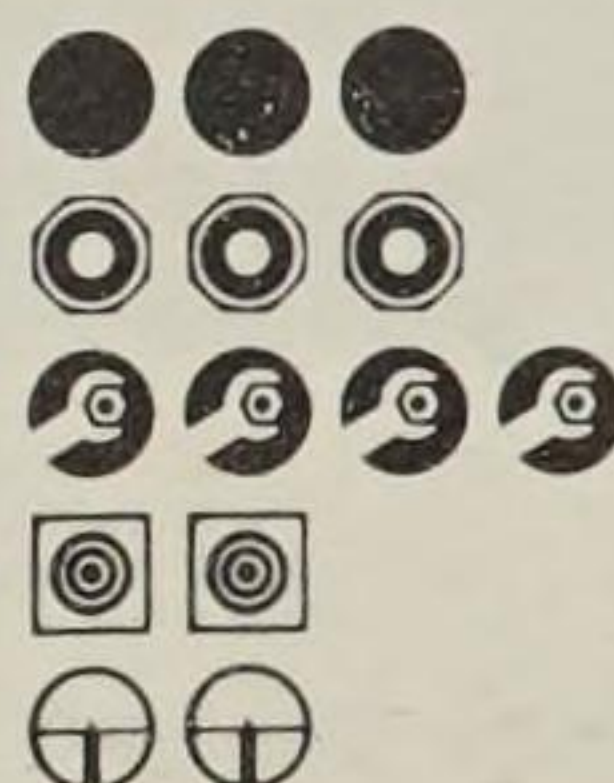
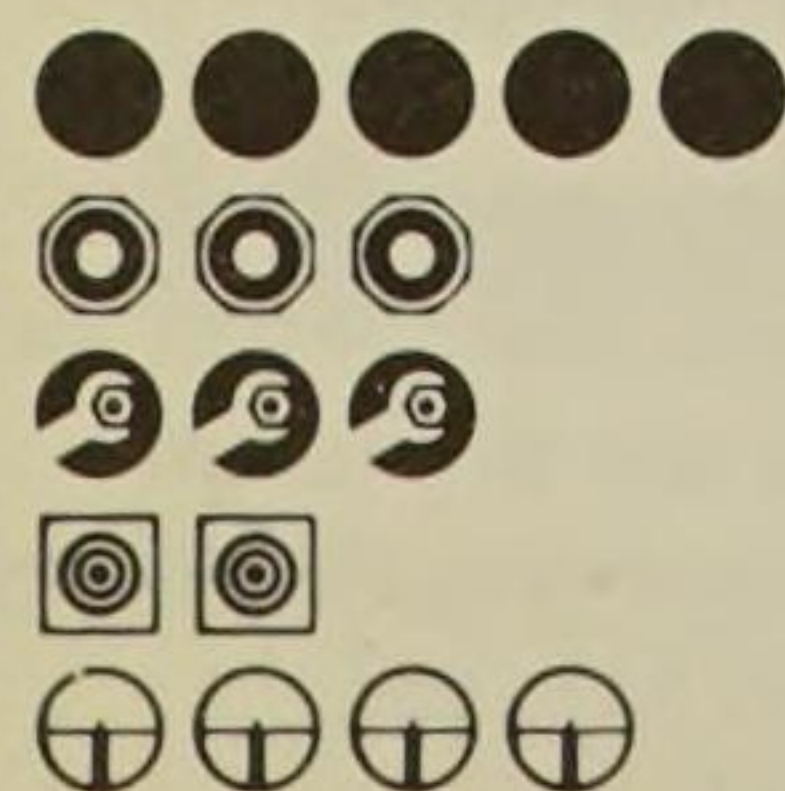
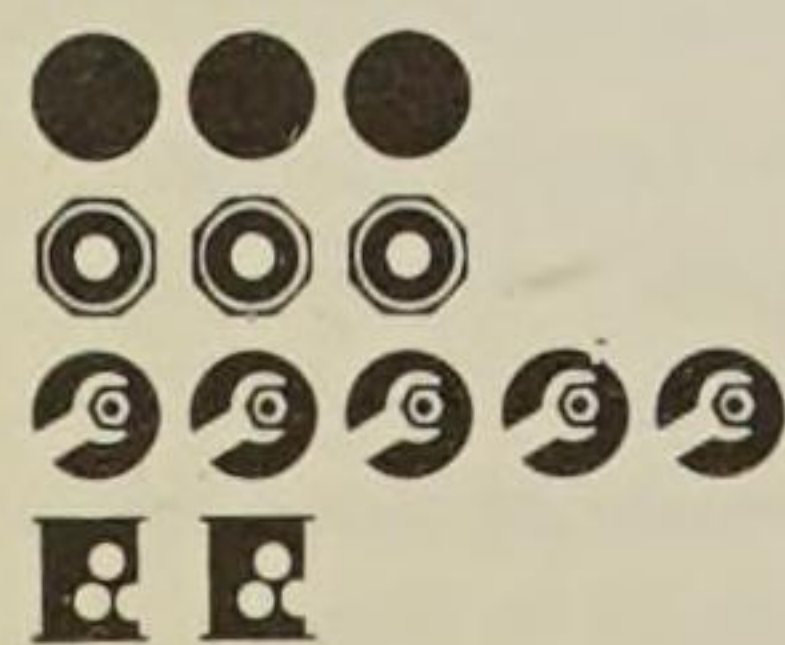
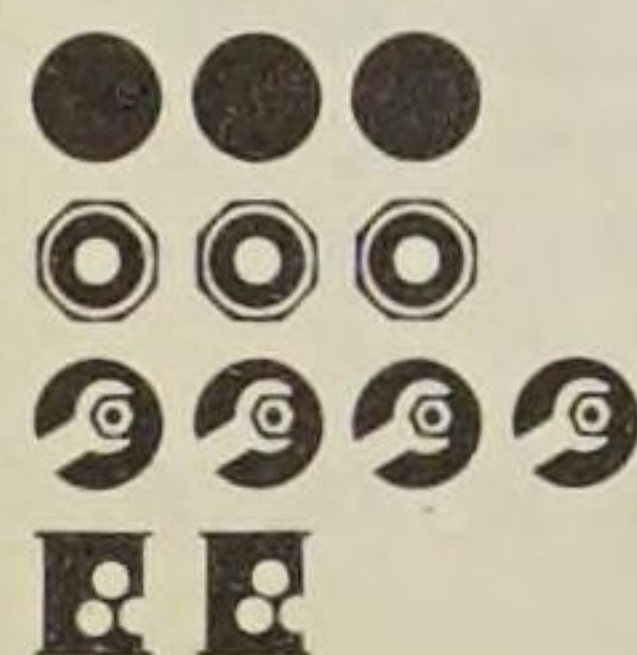
Dating from 1972, this 'Series 70' junior rifle originally had an open adjustable spring-leaf back sight. Newer guns have a more compact improved pattern; a hooded ramp-mounted blade has now replaced the old hooded post front sight. The 1976 series had a pistol-grip stock with a deep squared fore-end, but the 1979 version has a rounded fore-end and a slight Monte Carlo comb on the butt. The simple non-adjusting double-pull trigger is set at about 3kg (7lb). *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4; *cal*, 4.5/0.177 (G76/1), 5.5/0.22 (G76/2); *loa*, 953/37.5; *bl*, 385/15.2; *rf*, 8R; *wt*, 1.98/4.37; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

Milbro Diana G77/1 and G77/2

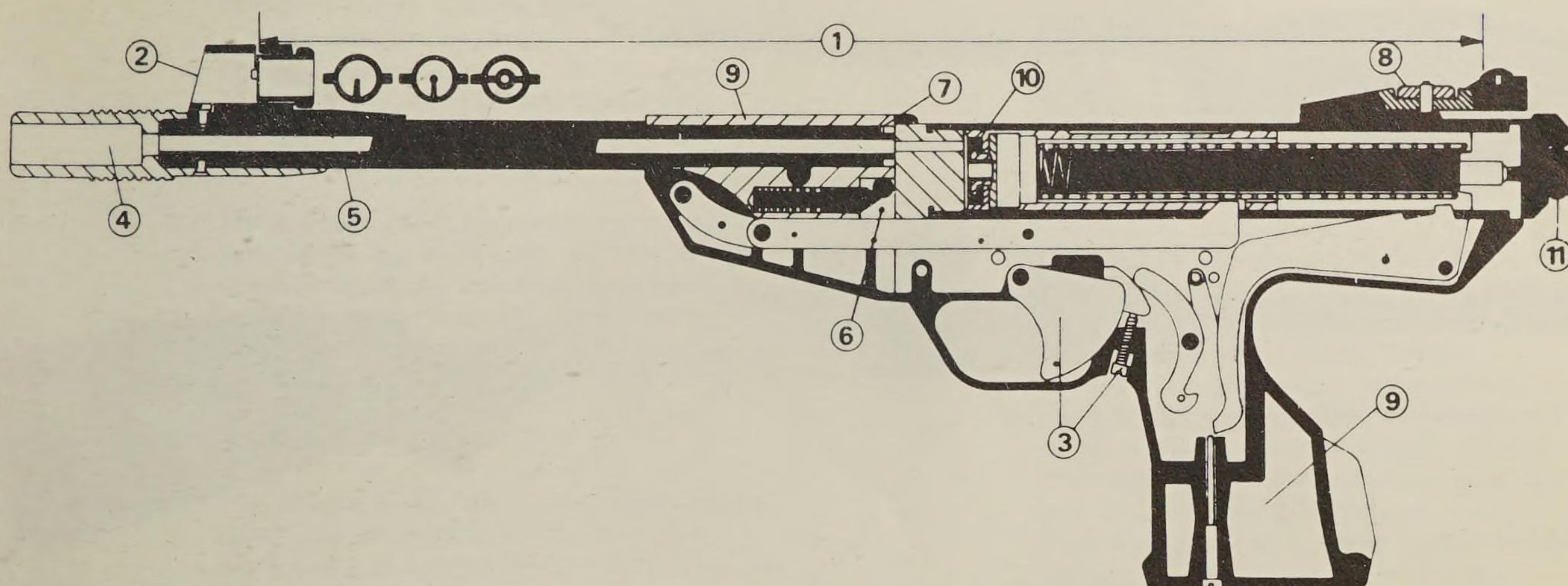
This smaller version of the G79/G80 appeared in 1976. It had a fully adjustable spring-leaf back sight and a manual safety catch (designed by Colin Fisher in 1965) on the rear right side of the air cylinder. This, however, was abandoned in the late 1970s. The back sight was replaced by the 'saddle' pattern in 1977/78 and the stock was redesigned in 1979. The G77 now has the three-stage travel-adjustable trigger associated with the larger Milbro Dianas, though the second pull is set at about 2.5kg (5.5lb). The front sight is a hooded ramp-mounted blade. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4; *cal*, 4.5/0.177 (G77/1), 5.5/0.22 (G77/2); *loa*, 992/39.1; *bl*, 400/15.1; *rf*, 8R; *wt*, 2.73/6.02; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

Milbro Diana G79/1 and G79/2

A larger version of the G77, the G79 made its debut in 1976, featuring the three-stage trigger, a larger better-shaped beech stock and a moulded plastic trigger guard. The G79 was discontinued late in 1979, when its design was merged with the G80. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4/R3; *cal*, 4.5/0.177 (G79/1), 5.5/0.22 (G79/2); *loa*, 1.060/41.7; *bl*, 438/17.2; *rf*, 8R; *wt*, 2.82/6.22; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.



Milbro G5/1 Cougar



For key to parts illustrated, see manufacturer's literature

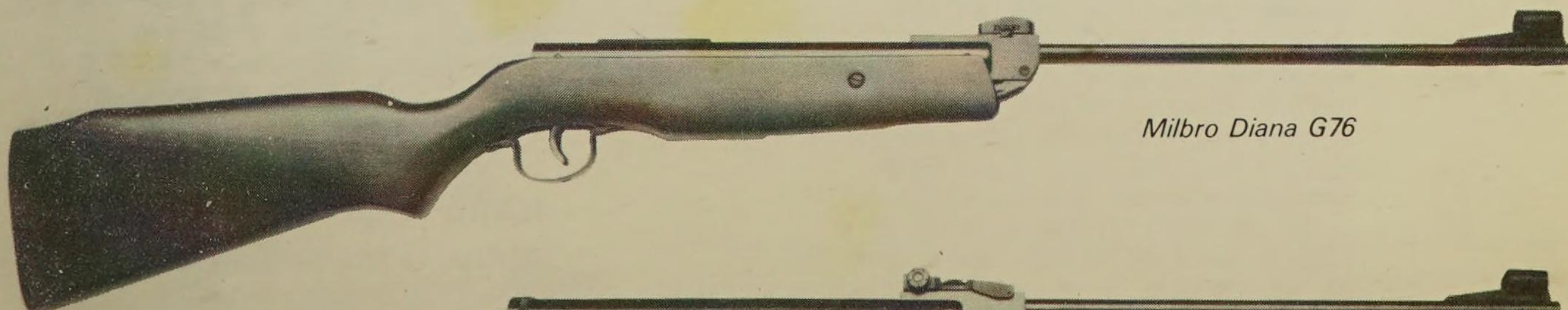


Milbro G5/1 Cougar

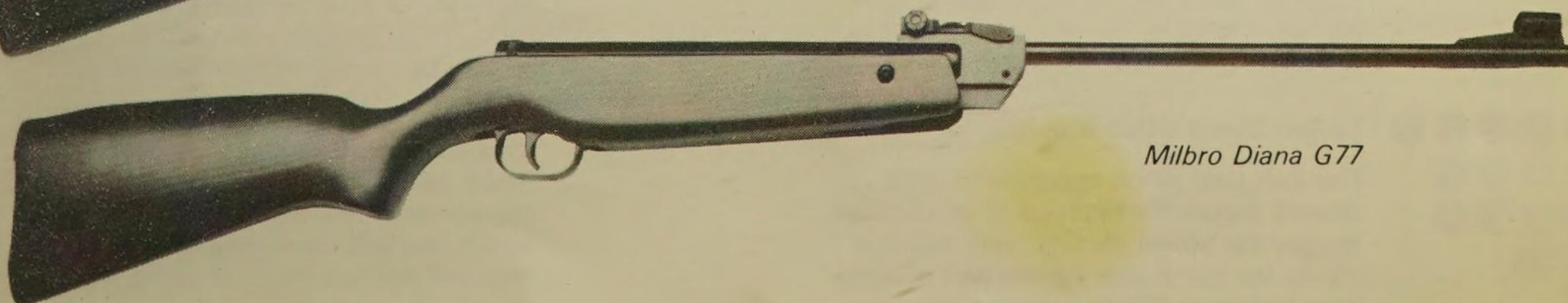
Discontinued Milbro guns

Model	G4/1 (Zenit)	G74	G75
Class	P4	R5	R5/R4
Calibre	4.5/0.177	4.5/0.177	4.5/0.177
Length			
overall	280/18.92	837/32.64	917/35.76
barrel	140/5.46	356/13.88	358/13.96
Weight	0.67/1.48	1.41/3.11	1.94/4.28
Rifling	?	—	12R
Date	1950 – 77	1972 – 78	1972 – 78

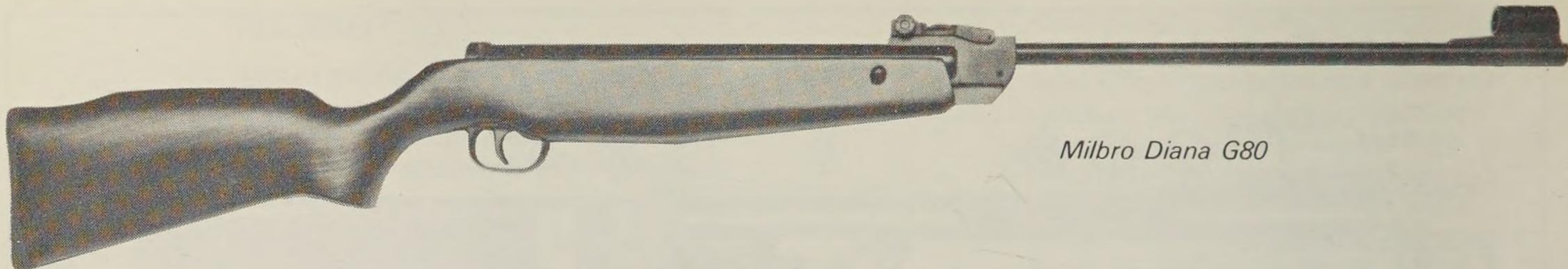
Note. The old Milbro Dianas 15, 16, 23 and 27, production of which commenced in 1949/50, were identical with the pre-war Mayer & Grammelspacher patterns.



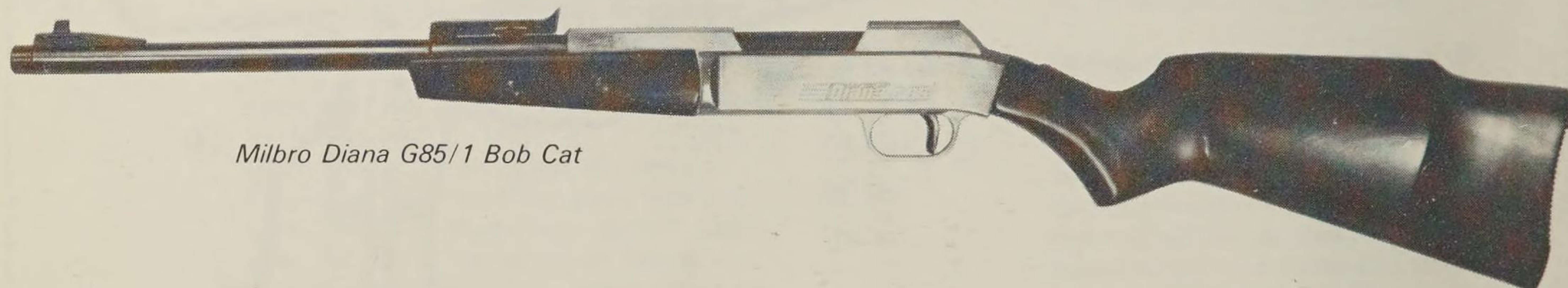
Milbro Diana G76



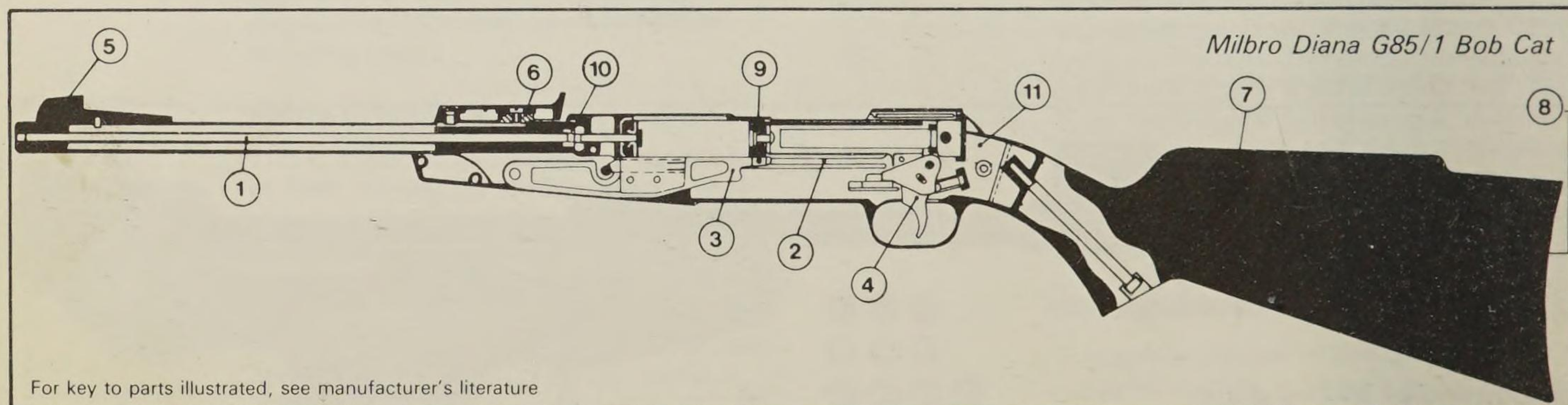
Milbro Diana G77



Milbro Diana G80



Milbro Diana G85/1 Bob Cat



Milbro Diana G85/1 Bob Cat



Milbro Diana G80/1 and G80/2

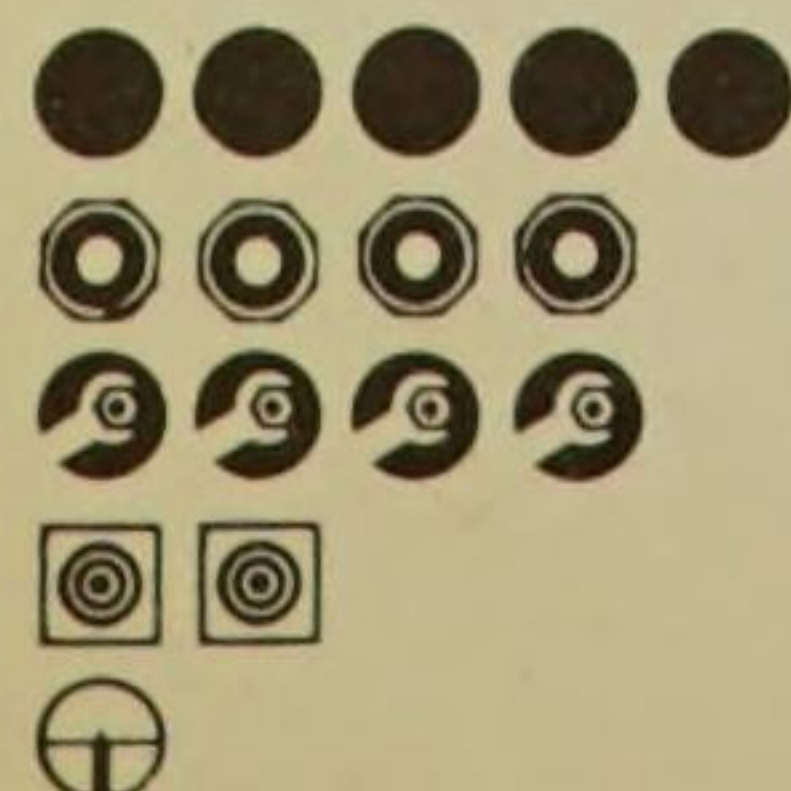
The competitively priced G80 was introduced in 1976, but extensively revised in 1978 and 1979. All guns have the standard multi-stage trigger unit (shared with the G77 and G79), a replaceable-insert cast alloy 'crackle finish' tunnel pattern front sight, and a matching fully adjustable saddle-type back sight. The varnished beech stock originally had a deep, squared fore-end with pressed-in chequering on the pistol grip, a cheekpiece, Monte Carlo comb, white spacer and ventilated rubber butt-plate; late in 1979, however, a more rounded fore-end style appeared, and chequering and the spacer were abandoned. Unfortunately, the new stock has a shallowly curved pistol grip ill-suited to users with small hands, whose fingers may not reach the trigger. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177 (G80/1), 5.5/0.22 (G80/2); *loa*, 1,080/42.5; *bl*, 440/17.6; *rf*, 8R; *wt*, 2.88/6.35; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

receiver contains the air cylinder unit and the simple non-adjusting trigger mechanism, while the shapely wood butt has a cheekpiece and a Monte Carlo comb. Though easily shortened, the butt is too long for many juniors; it is a shame that alternative lengths are not available. The ramp-mounted blade and vertically-adjustable notch open sights are tough plastic, and an efficient trigger-blocking automatic safety prevents premature piston release. Though possessing only average accuracy, the advanced features of the Bob Cat place it among the best in its class. *Type*, break-barrel spring-air rifle, locked by a cocking lever catch; *cl*, R5; *cal*, 4.5/0.177; *loa*, 862/33.9; *bl*, 320/12.6; *rf*, none; *wt*, 1.68/3.70; *s*, synthetic; *sft*, automatic.

NARC

National Air Rifle Company, Bombay (?), India. UK distributor: none; US distributor: none; Standard warranty: unknown.

This company was granted a licence to make the Hämmerli (see page 74) Cadet gas-powered rifle in 1968, production of which was still continuing in 1980. It is believed that a number of spring-air guns are also being made.



Milbro Diana G85/1 Bob Cat

The Bob Cat, which appeared in 1978, cleverly makes the best use of an obsolete design, the Model 15/G74, with which it shares the barrel liner system and cocking lever lock-bolt. The two-piece cast alloy

PREDOM LUCZNIK

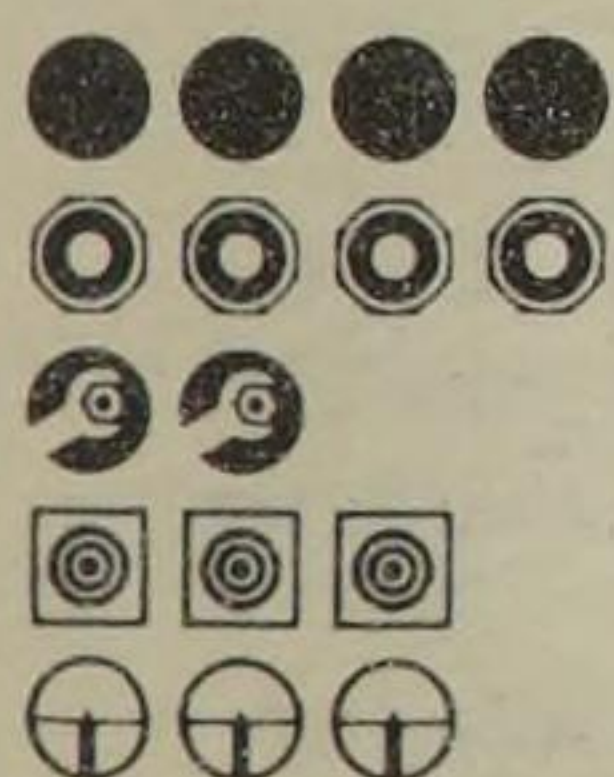
Predom Lucznik, Zakłady Metalowe im Gen. Waltera, Radom. Exporter: Universal Foreign Trade, Warszawa, Al. Jerzolimskie 44; UK distributor: formerly Viking Arms Co; US distributor: none; Standard warranty: unknown.

These Polish-made airguns appeared in the early 1970s, but were only imported in small numbers and for a very limited period. Their quality was not especially impressive, but both the 170 and 188 incorporated some interesting characteristics.



KI. 141

This simple, junior rifle is a standard design, with a well finished beech pistol-gripped stock and a simple blade front sight. The back sight, however, is an interesting and unusual spring-leaf type – adjustable for elevation only – in which a slider engages transverse notches milled in the air cylinder. *Type*, break-barrel spring-air rifle, detent-locked (bolt?); *cl*, R5/R4; *cal*, 4.5/0.177; *loa*, 920/36.2; *bl*, 370/14.6; *rf*, 12R; *wt*, 1.65/3.64; *ps*, leather washer; *bs*, leather ring; *sft*, none.



KI. 170

This is a low-priced copy of the Walther LP53, sharing the same barrel-cocking butt-cylinder construction, but exhibiting a few external detail differences. Robust and quite well made, though lacking the quality of its

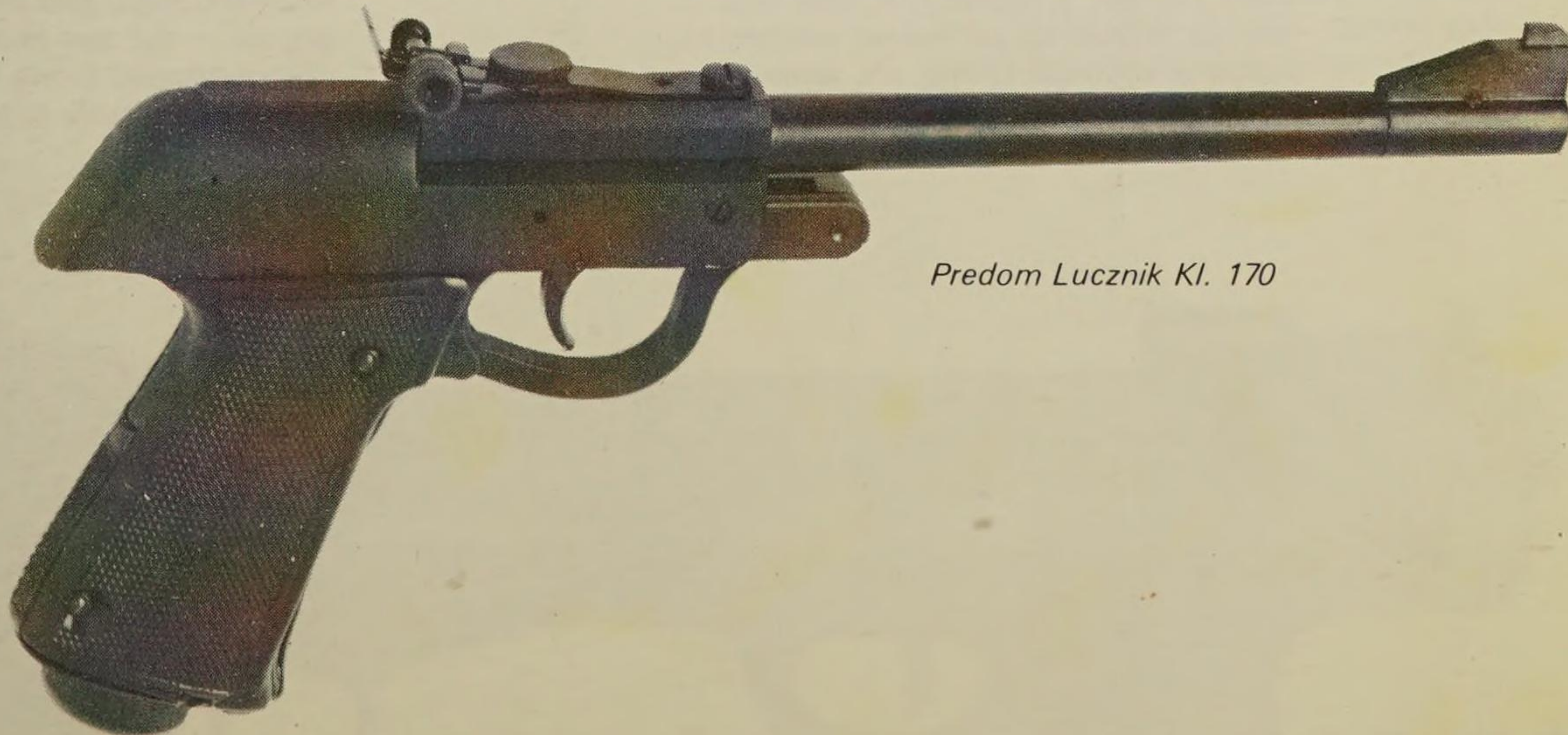
prototype, it offered acceptable performance and good value. Production was suspended in the mid-1970s, but is apparently scheduled to recommence. Details are generally as those for the Walther LP53 (see page 107), but the breech seal is a leather ring type.

KI. 187

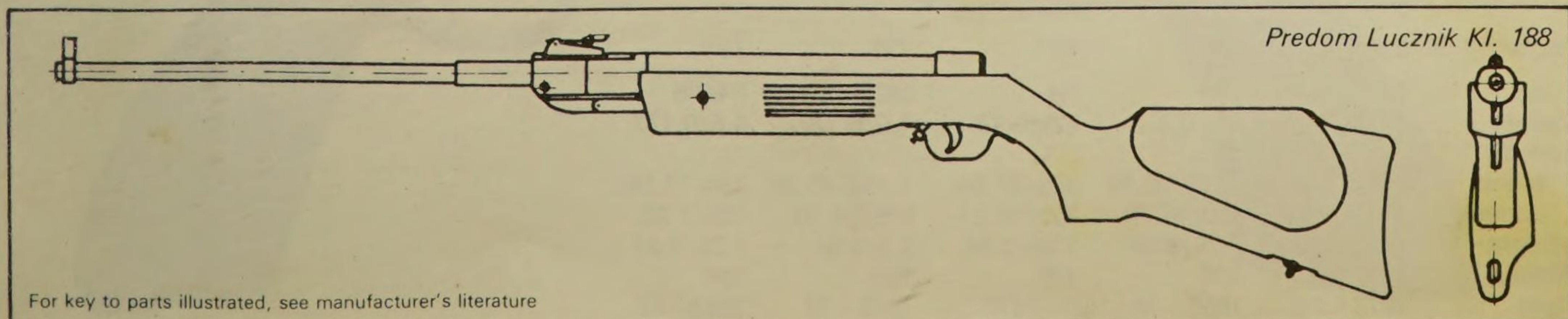
This sturdy obsolescent-looking gun, with an external trigger-adjusting screw in the front of the trigger guard, had some good features including a solidly forged articulated cocking lever and excellent internal cylinder/piston surface finish. It had sling swivels on barrel and butt, a simple vertically-adjustable tangent-leaf back sight and a hooded blade front sight. *Type*, break-barrel spring-air pistol, detent-locked (pawl); *cl*, R3/R4; *cal*, 4.5/0.177; *loa*, 1,104/44.2; *bl*, 484/19.1; *rf*, 12R; *wt*, 3.00/6.62; *ps*, leather or PTFE washer; *bs*, leather ring; *sft*, automatic.

KI. 188

This was a larger version of the 187, distinguished by a small barrel-locking catch, a heavier stock with a markedly deeper fore-end and a shorter butt. The sights, swivels and general construction remained unchanged. *Type*, break-barrel spring-air pistol, positively-locked barrel; *cl*, R3; *cal*, 4.5/0.177; *loa*, 1,086/42.8; *bl*, 484/19.1; *rf*, 12R; *wt*, 3.43/7.56; *ps*, leather or PTFE washer; *bs*, leather ring; *sft*, automatic.



Predom Lucznik KI. 170



Predom Lucznik KI. 188

For key to parts illustrated, see manufacturer's literature

PŘESNÉ STROJÍRENTSVÍ

Přesné Strojírentsví, Uherský Brod, Czechoslovakia. Exporter: Merkuria, Argentinská Ulice 38 CS-170 05 Praha 7; UK distributor: Edgar Brothers; US distributor: Precise Imports Corp.; Standard warranty: unknown.

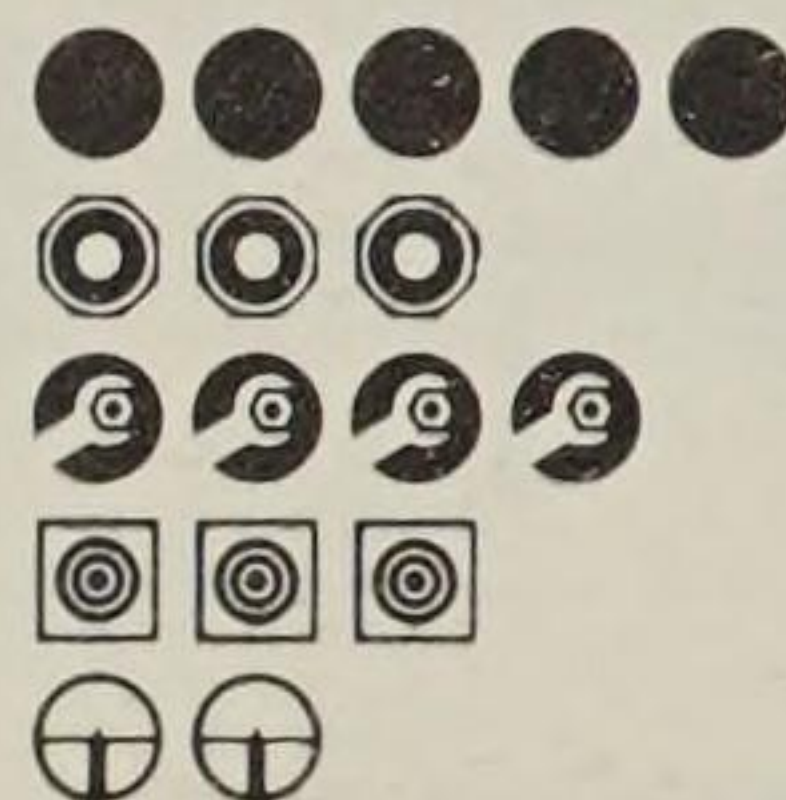
This state-run factory, formerly part of the giant Ceskoslovenská Zbrojovka arms-making company, was nationalized after the 1948 revolution and now makes Slavia airguns on a desultory basis.

Slavia 624

This junior or intermediate rifle, still available in 1979, was an enlargement of the 618; it has a non-adjustable simple trigger, a hooded front sight and an open spring-leaf back sight. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R5; *cal*, 4.5/0.177; *loa*, 965/38.0; *bl*, 390/15.4; *rf*, 10R; *wt*, 1.65/3.64; *ps*, leather washer; *bs*, leather or synthetic O-ring; *sft*, none.

Slavia 630

This solid, well-finished design dates from 1971. It has a conventional piston system, an articulated cocking lever and a delicate adjustable two-stage trigger. The front sight is a tunnel type, the rear a metal 'saddle' adjustable for elevation only. A knurled safety-catch head protrudes from the rear of the air cylinder, where it must be reset before each shot. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177; *loa*, 1,160/45.7; *bl*, 505/19.9; *rf*, 10R; *wt*, 3.00/6.62; *ps*, leather washer; *bs*, rubber or synthetic O-ring; *sft*, semi-automatic.



Slavia 631

This has a longitudinally sliding barrel-lock, but is otherwise much the same as the 630. It has a micro-adjustable 'saddle' back sight and an extraordinary squared stock with a slab-sided butt. *Type*, break-barrel spring-air rifle, positively-locked barrel; *cl*, R5; *cal*, 4.5/0.177; *loa*, 965/38.0; *bl*, 390/15.4; *rf*, 10R; *wt*, 3.13/6.90; *ps*, leather washer; *bs*, leather or synthetic O-ring; *sft*, none semi-automatic.

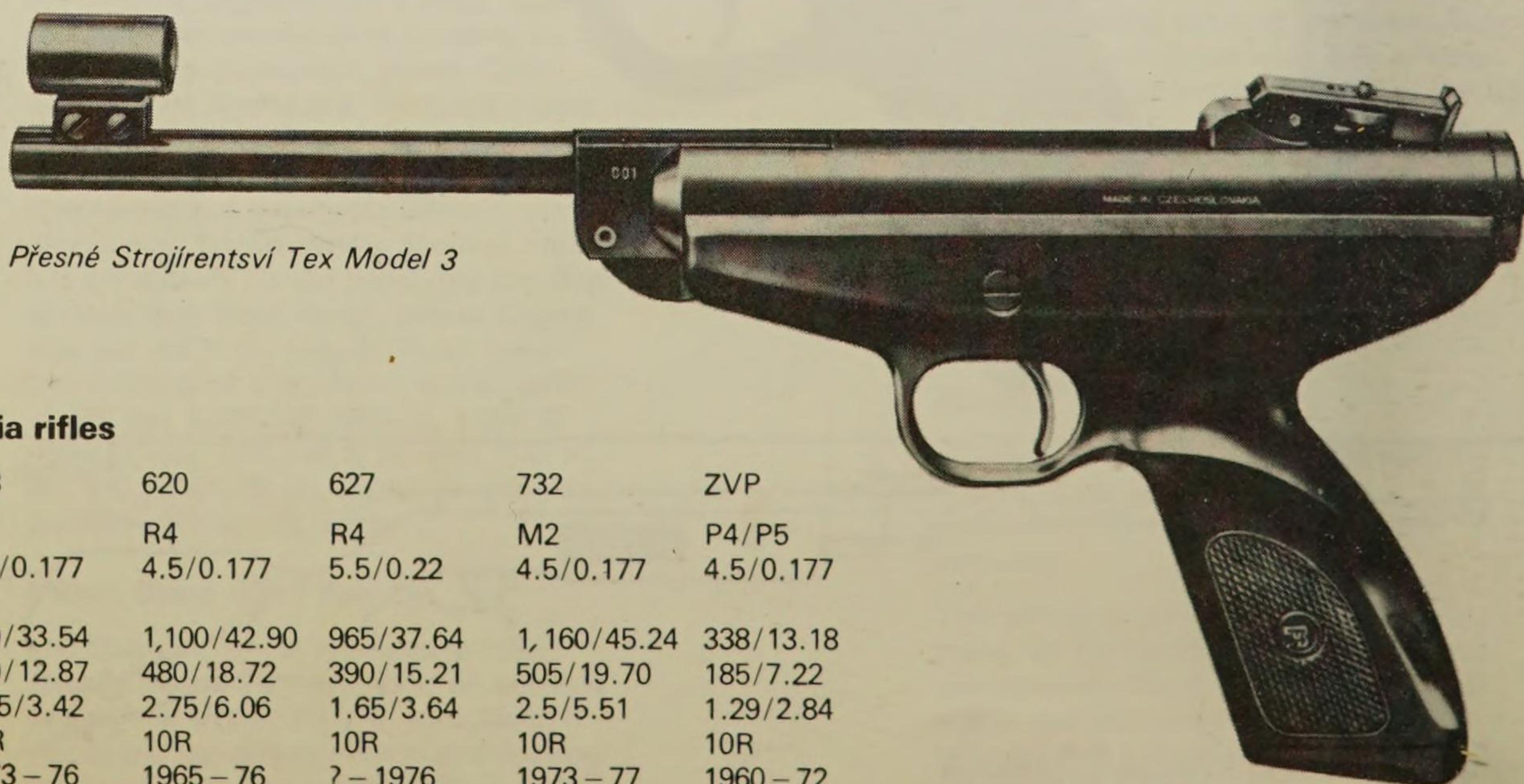
Tex 086 (Model 3)

The Tex is a popular, low-cost, value-for-money target pistol, solidly machined from gunmetal forgings. It has an articulated cocking lever, an adjustable trigger (4 – 9lb, 1.8 – 4kg) and an automatic safety that prevents premature piston release. Older guns have vertically-adjustable front sights and open back sights that will only move laterally, but the 1980 version or Model 3 has a proper micro-adjustable back sight. *Type*, break-barrel spring-air pistol, detent-locked (bolt); *cl*, C3:P4; *cal*, 4.5/0.177; *loa*, 346/13.8; *bl*, 185/7.3; *rf*, 12R; *wt*, 1.22/2.70; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, automatic.

ROSSI

Amadeo Rossi SA, Metalúrgica e Municiões, CP28-Sao Leopoldo, R.G.S., Brazil. UK distributor: under negotiation; US distributor: none; Standard warranty: unknown.

Better known as a maker of pistols and revolvers, Rossi also makes a range of airguns – the best known of which is the unsophisticated Dione Modelo 17, a barrel-cocker comparable to the Arizmendi Norica



Obsolete Slavia rifles

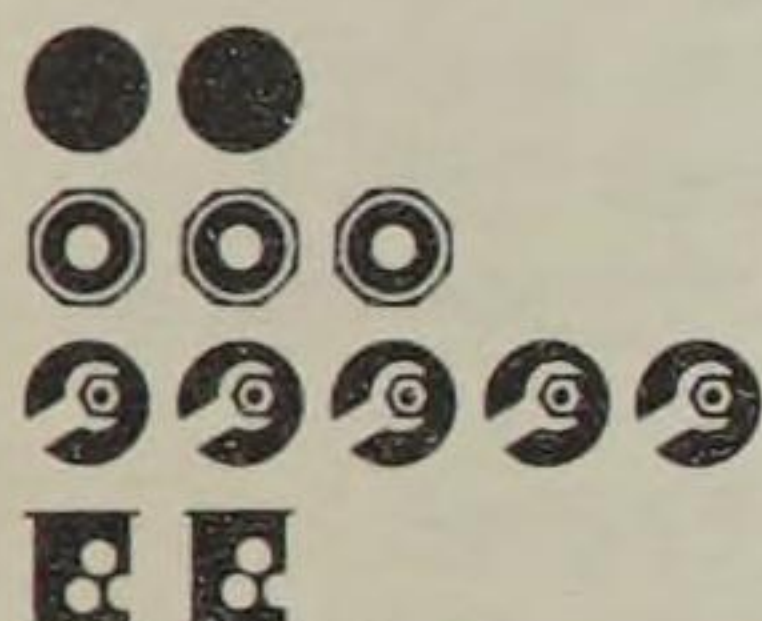
Model	618	620	627	732	ZVP
Class	R4	R4	R4	M2	P4/P5
Calibre	4.5/0.177	4.5/0.177	5.5/0.22	4.5/0.177	4.5/0.177
Length					
overall	860/33.54	1,100/42.90	965/37.64	1,160/45.24	338/13.18
barrel	330/12.87	480/18.72	390/15.21	505/19.70	185/7.22
Weight	1.55/3.42	2.75/6.06	1.65/3.64	2.5/5.51	1.29/2.84
Rifling	10R	10R	10R	10R	10R
Date	1973 – 76	1965 – 76	? – 1976	1973 – 77	1960 – 72

Mo. 61-C (see page 36). However, Rossi guns are as yet rarely seen outside Brazil.

SCHMIDT

Herbert Schmidt, POB 126, D-8745 Ostheim/Rhön, West Germany. UK distributor: none; US distributor: none; Standard warranty: 12 months.

Schmidt makes starting pistols in addition to several insignificant low-cost airguns.



HS9A

This gun suffers all the drawbacks common to push-in barrel pistols, although it is quite well made from good-class materials. The HS9A has black plastic grips and simple fixed sights. *Type*, push-in barrel spring-air pistol, loaded through a rear port; *cl*, P5; *cal*, 4.5/0.177; *loa*, 210/8.3; *bl*, N/A; *rf*, none; *wt*, 0.35/0.77; *ps*, synthetic washer; *sft*, none.



HS71

A well finished but unsophisticated pistol, the HS71 fires ball ammunition (Rundkugel Nr.11, not the smaller BB). It has a fully adjustable back sight – an anachronism in this class – and a brown plastic combination grip/frame unit. *Type*, fixed-barrel sidelever-cocking spring-air pistol; *cl*, P5; *cal*, 4.5/0.177 (ball only); *loa*, 300/11.8; *bl*, not known; *rf*, none; *wt*, 0.95/2.09; *s*, synthetic; *sft*, none; *mag*, 100-shot tube (barrel casing).

SETRA

José Artes de Arcos SA, 8-Hortaleza 100, Madrid 4. UK distributor: under negotiation; US distributor: none; Standard warranty: unknown.

Setra  

This is a conventional Sheridan/Benjamin-type multi-stroke pneumatic rifle, apparently in 0.2in calibre, but displaying much poorer quality. It may be operated with as many as 40 pump-strokes, but the variable quality of the valves leads to varying power: some guns will easily exceed the UK 12fp limit, while others will not even approach it. The Setra is a large gun – about 1,020mm/40.2in long and weighing about 2.8kg/6.2lb. It has a very distinctive red plastic safety catch on the tang behind the bolt-loading system.

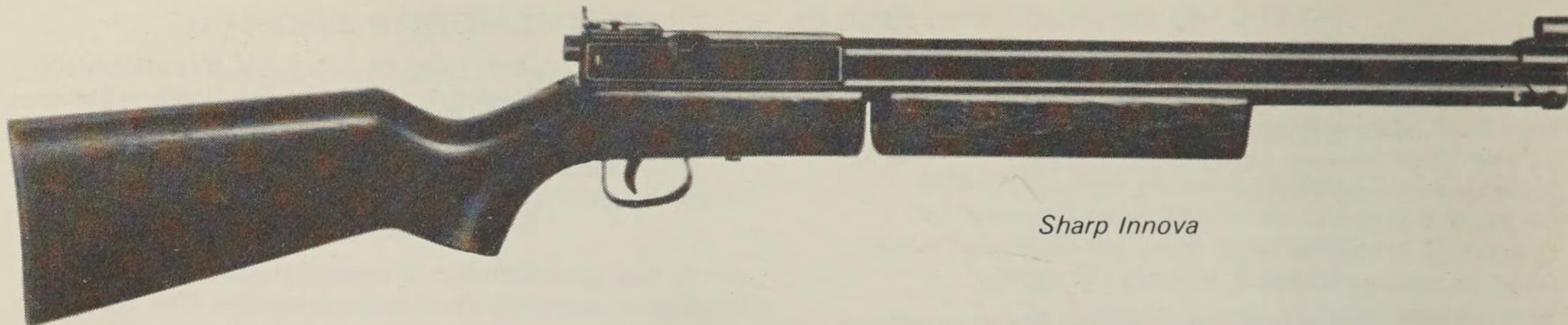
SHARP

Sharp Rifle Manufacturing Company Ltd., No.8 2-Chome, Yotsuya, Shinjuku-ku, Tokyo, Japan. UK distributor: Hull Cartridge Co.; US distributor: none; Standard warranty: unknown.

This company was founded in 1952 as the Tokyo Rifle Laboratory by Kensuke Chiba, a well-known marksman and airgun inventor. The Tokyo Rifle Co. Ltd appeared in 1955 and the associated Sharp organization in 1960. Some twenty different gas and pneumatic gun designs have been marketed, though details are still awaited. The GR75 carbon-dioxide powered slide action box-magazine repeater (1975) and the 'World One' single-stroke pneumatic

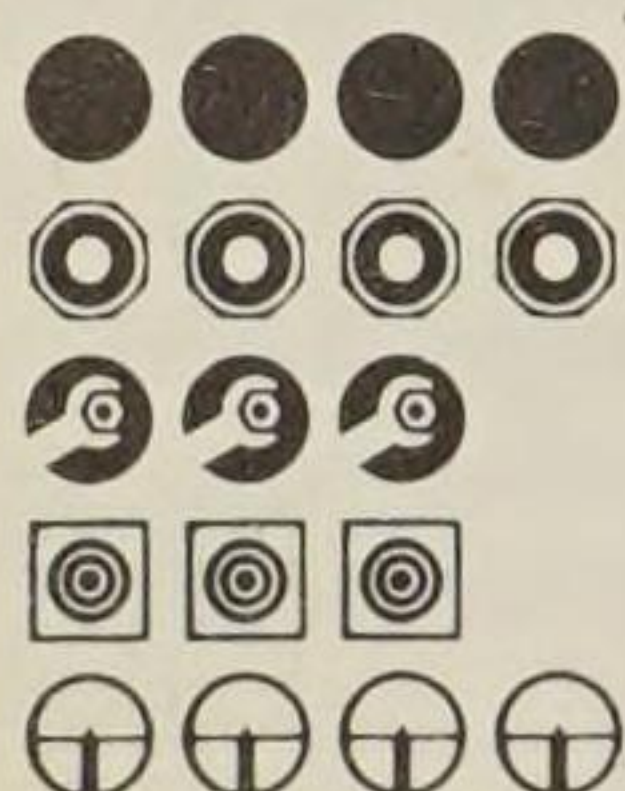


Schmidt HS71



Sharp Innova

match rifle of 1979 have particularly impressive specifications.



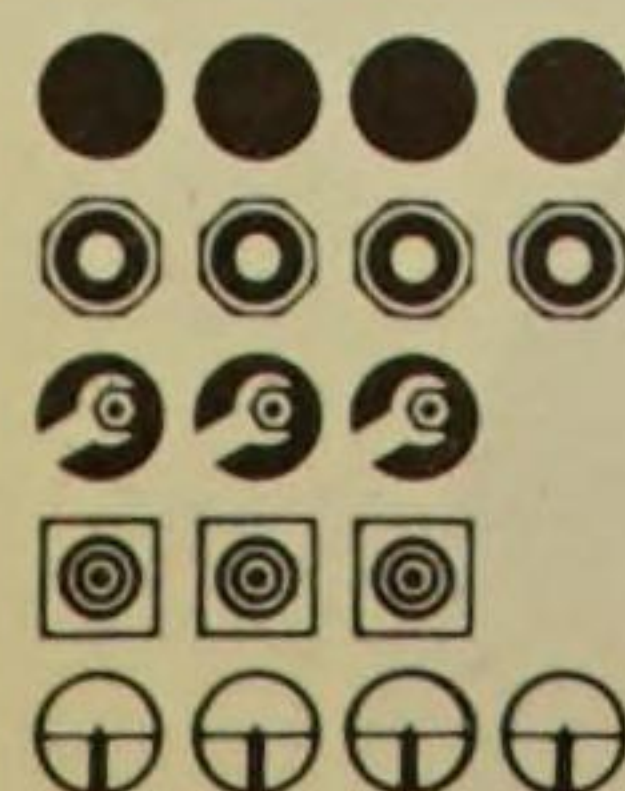
Sharp Innova

Introduced in 1977, but rarely seen outside Japan until recently, the good-quality Innova is an American-style multi-stroke pneumatic rifle with a patented rod-valve system – giving vibration-free firing – and a spring-operated bolt loading system. Once the rifle has been pumped, the operating button is pressed to release the bolt, a pellet is placed in the loading port and the bolt pushed manually forward. The stock and pump handle are well finished in wood, though the butt is short and there is no butt-plate. The back sight is a peep-type, the front sight a hooded blade. The Innova will develop nearly 1,000fs (4.5/0.177in calibre) with eight pump strokes, but the guns seen in Britain have an additional exhaust valve and a four-stroke lower-power pump system to restrict velocity to the legal limits. *Type*, fixed-barrel swinging fore-end multi-stroke pneumatic rifle; *cl*, R2/R1; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 879/34.6; *bl*, 508/20.0; *rf*, 12R?; *wt*, 2.06/4.54; *s*, synthetic; *sft*, manual.

SHERIDAN

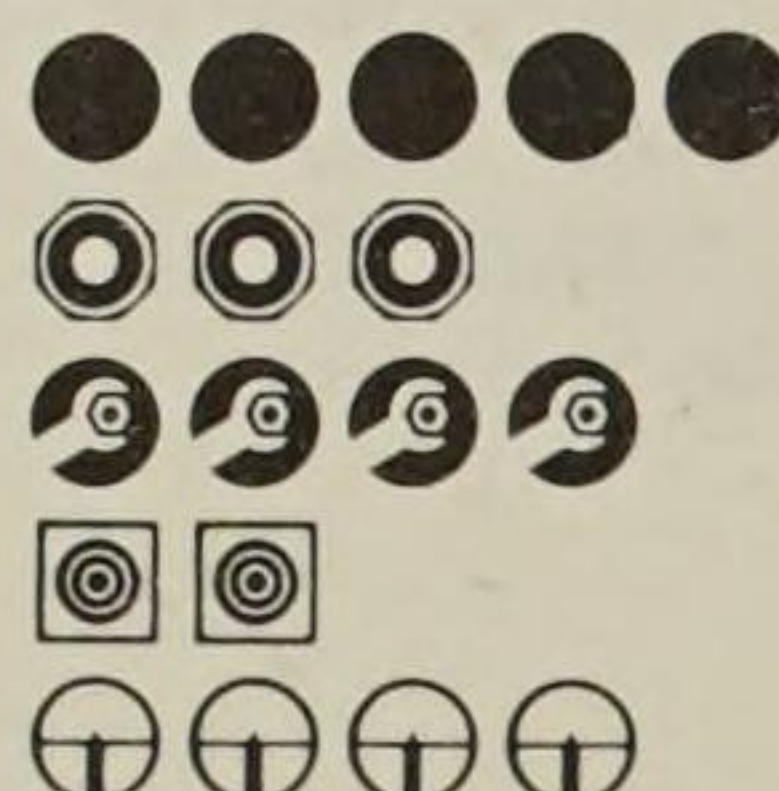
Sheridan Products Inc., 3205 Sheridan Road, Racine, Wisconsin 53403, USA. UK distributor: Sussex Armoury; Standard warranty: 90 days*.

Sheridan is a comparatively new company, its first airguns – designed by Robert Kraus – appearing in 1946. Very few models have been made, which is testimony to the excellence of the basic designs but also partly reflects the company's fluctuating fortunes. Benjamin now hold the majority of the company's shares, which they acquired in 1976, although Sheridan still trades independently.



Sheridan Model C

This was first made in 1949, and has undergone few changes since. The present sliding safety – which runs laterally under the retaining cap – appeared in 1963 and a short plastic hand guard was added above the breech in the mid-1970s. The Model C



Sheridan Model EB (or Model E)

This sturdy gas-pistol appeared in 1978, combining the Sheridan gas system with a bolt-loading action similar to the Benjamin 130 series. It displays matt finish, a simple non-adjustable two-stage trigger and unsophisticated sights, the back sight being screw-elevated and adjusted laterally by sliding across its locating slot. Grips are simulated walnut. *Type*, fixed-barrel gas-powered pistol; *cl*, P2; *cal*, 5.0/0.20; *loa*, 229/9.0; *bl*, 165/6.5; *rf*, N/A; *wt*, 0.76/1.68; *s*, synthetic; *sft*, manual.



Sheridan Model F

This carbon-dioxide powered derivative of the Model C – sharing the sights, trigger and other internal components – was introduced in 1976. Gas cartridges are contained in the 'air' tubes below the barrel, one 12gm cylinder to each gun. The distinctive half-stock lacks the pump-handle associated with the pneumatics. The Model F develops less power and displays greater velocity fluctuations than the Model C, but is certainly easier and less tiring to fire. *Type*, gas-powered fixed-barrel rifle; *cl*, R3; *cal*, 5.0/0.20; *loa*, 940/37.0; *bl*, 470/18.5; *rf*, N/A; *wt*, 2.70/5.95; *ps*, synthetic; *sft*, manual.



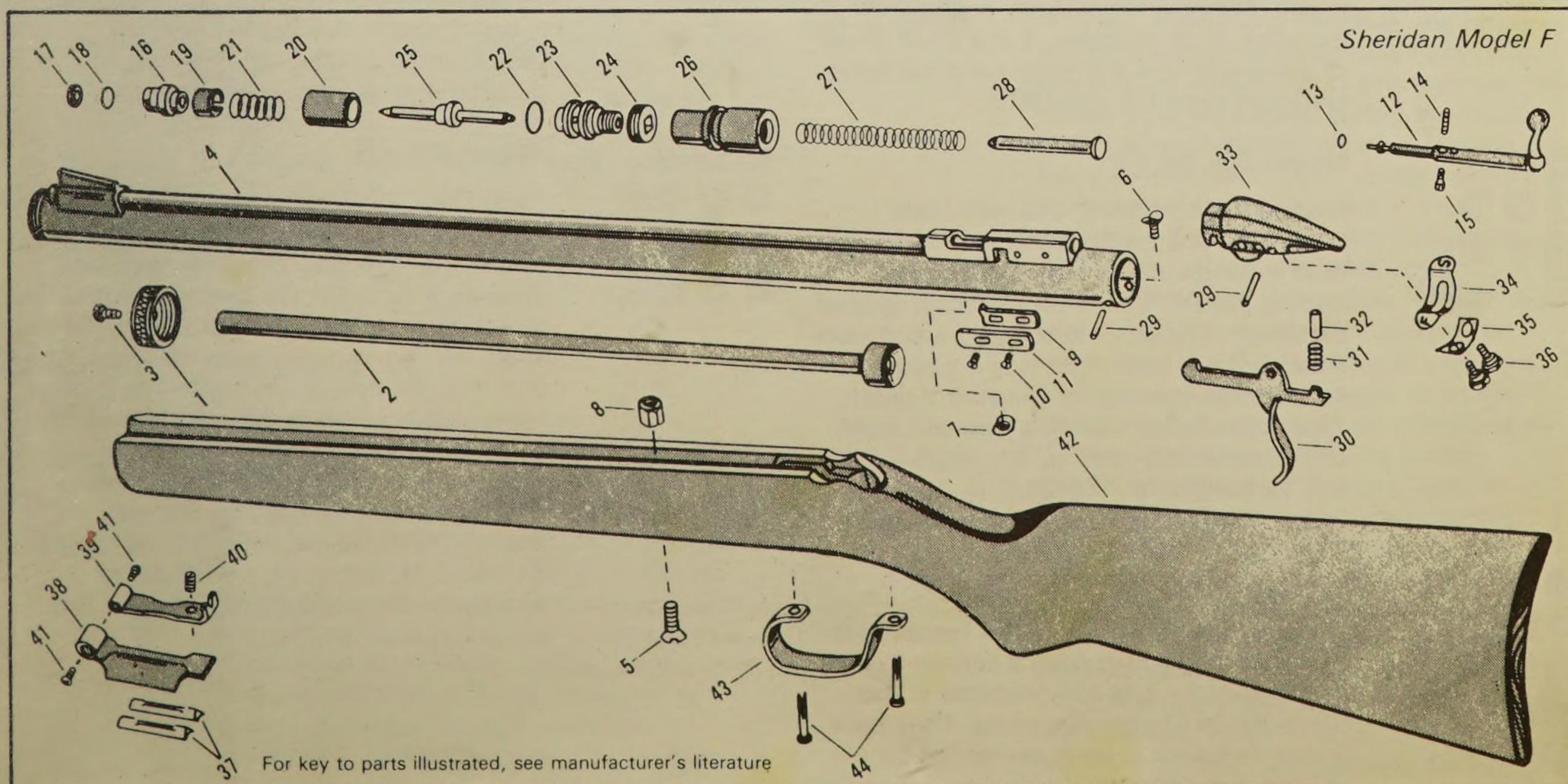
Sheridan Model C



Sheridan Model EB

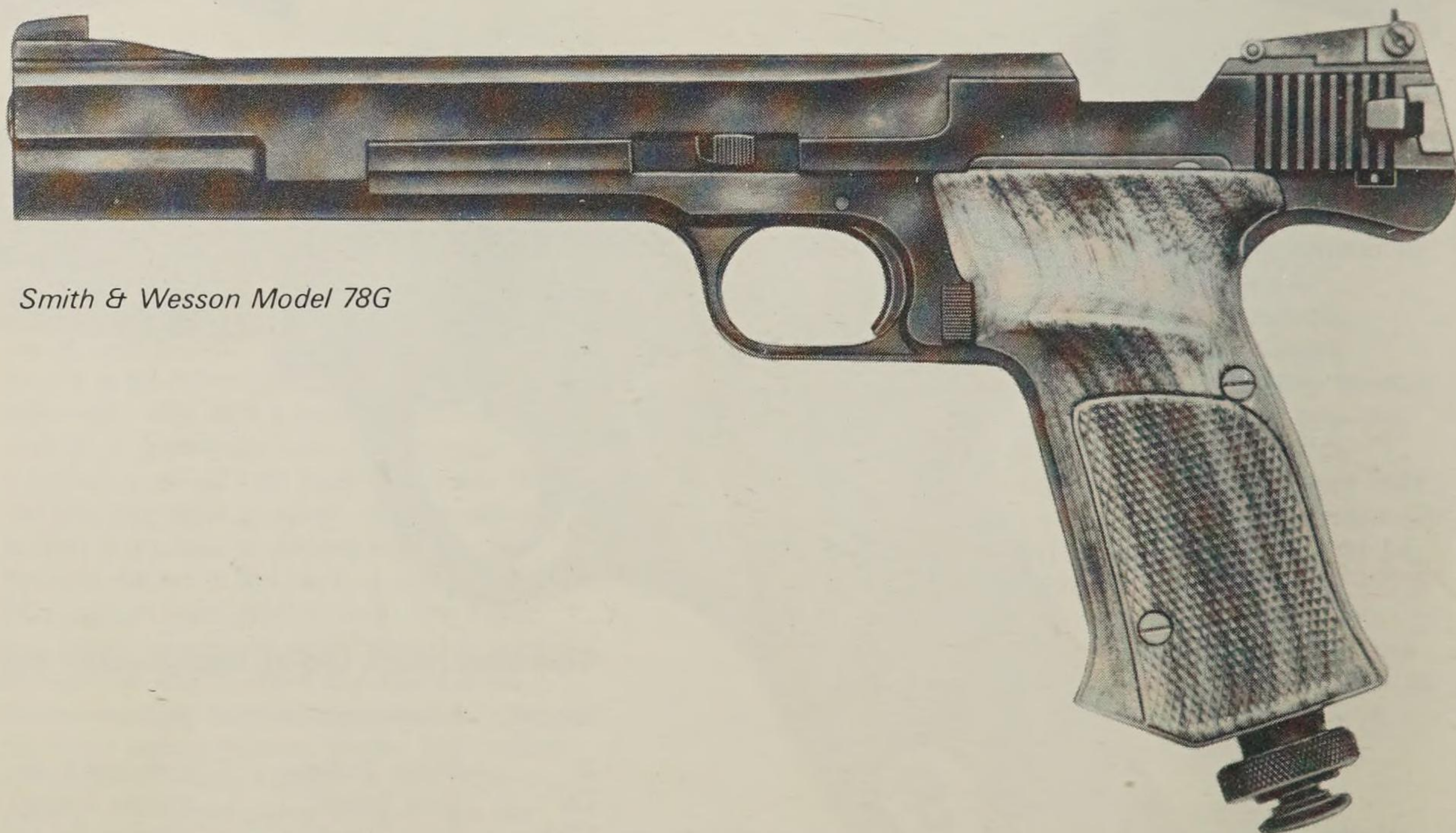
Sheridan rifles: finish, designation and sights

Model	Finish type	Sights	Propellant
C	Silver Streak	standard open	air
CB	Blue Streak	standard open	air
CBS	Blue Streak	Weaver D4 telescope	air
CBW	Blue Streak	Williams 5DSH	air
CS	Silver Streak	Weaver D4	air
CW	Silver Streak	Williams 5DSH	air
F	Silver Streak	standard	gas
FB	Blue Streak	standard	gas
FBS	Blue Streak	Weaver D4	gas
FBW	Blue Streak	Williams 5DSH	gas
FS	Silver Streak	Weaver D4	gas
FW	Silver Streak	Williams 5DSH	gas





Sheridan Model F



Smith & Wesson Model 78G

SMITH & WESSON

Smith & Wesson Inc., 2100 Roosevelt Avenue, Springfield, Massachusetts 01101, USA. UK distributors: none (airguns); Standard warranty: 90 days*.

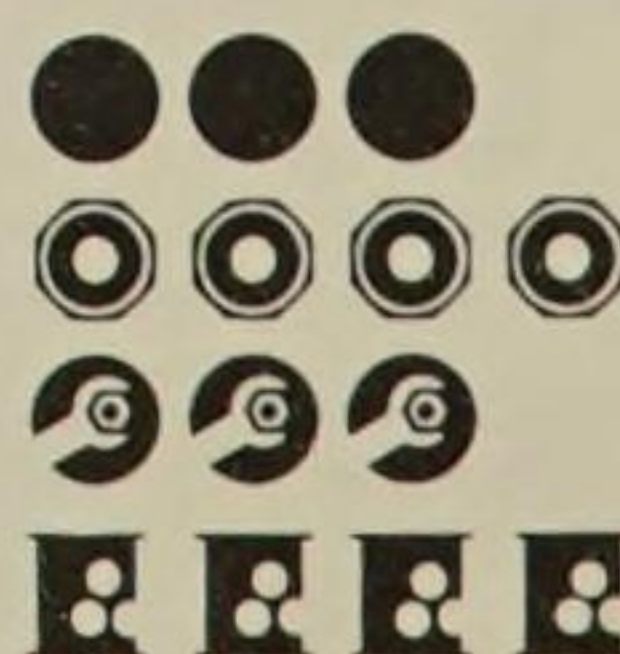
Smith & Wesson was formally organized in 1857, but has a history beginning some years earlier. The company's contribution to airgun development scarcely approaches the value of its revolvers, but a small range of gas-power and spring-air guns has been marketed since the mid-1960s.

is cocked by a catch in front of the trigger after the breechblock has been retracted to load. A safety lies behind the trigger aperture on the left side of the frame, the front sight is a fixed blade and the back sight a fully adjustable open notch. Manufacture of the pistols passed from Smith & Wesson to Daisy (see Daisy 780 and 790, page 61) in late 1980. *Type*, fixed-barrel gas-powered pistol; *cl*, C2:P2; *cal*, 5.5/0.22 (78G), 4.5/0.177 (79G); *loa*, 279/11.0; *bl*, 216/8.5; *rf*, 10R; *wt*, 1.15/2.54; *s*, synthetic; *sft*, manual.



Model 77A

Recently discontinued, this well made single-shot pneumatic featured a pump-lever locking catch and a lever-action loading system, which automatically applied the safety. The stock and the fore-end were wood and the back sight was a typically American stepped-slider elevated V-notch. *Type*, fixed-barrel swinging fore-end multi-stroke pneumatic rifle; *cl*, R1; *cal*, 5.5/0.22; *loa*, 1,016/40.0; *bl*, 560/22.0; *rf*, 10R; *wt*, 2.95/6.50; *s*, synthetic; *sft*, semi-automatic.



Model 80G

This is the company's only BB gun, which is well made and incorporates some interesting features. The projectiles load through a funnel in the synthetic stock. Gas is automatically cut off after the last shot is fired, and the gun can even be unloaded with the gas cylinder in place. The sliding manual safety lies on the tang behind the receiver. The adjustable back sight resembles that of the 77A. *Type*, fixed-barrel gas-powered gun; *cl*, R5; *cal*, 4.45/0.175 (BB); *loa*, 990/39.0; *bl*, 560/22.0; *rf*, none; *wt*, 1.47/3.24; *s*, synthetic; *sft*, manual; *mag*, 50-shot tube.



Models 78G and 79G

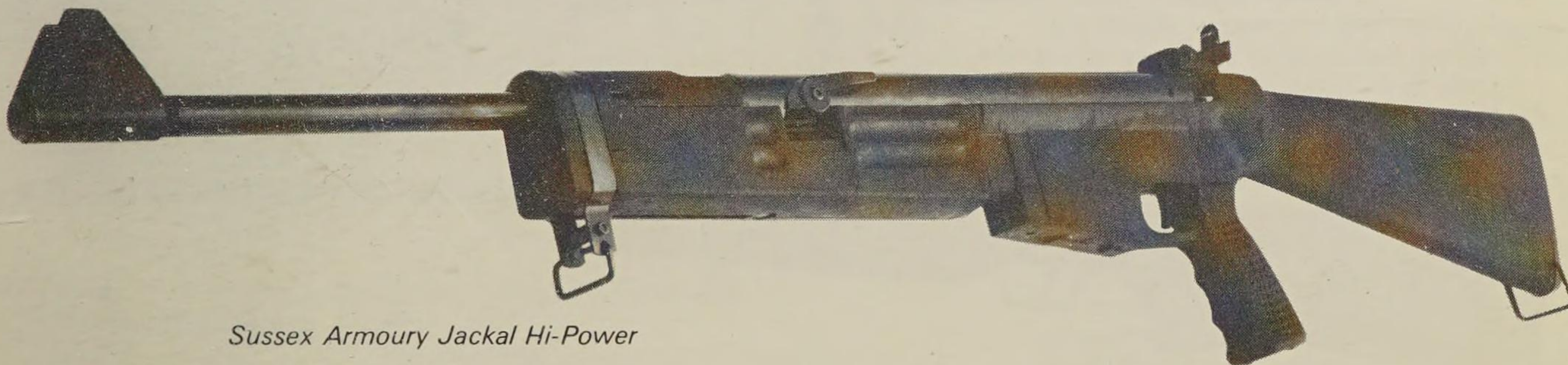
These two target-grade pistols appeared in 1966, deriving power from a carbon dioxide cartridge in the grip and modelled in the S&W Model 41 cartridge pistol. They have a variable power system, controlled by varying the striker spring tension; the striker



Smith & Wesson Model 80G



Sussex Armoury Jackal AR7



Sussex Armoury Jackal Hi-Power

SUSSEX ARMOURY

Sussex Armoury, Sturton Place, Station Road, Hailsham, East Sussex, England. US distributor: none; Standard warranty: 12 months.

Founded in 1968, Sussex Armoury has since sold militaria, airguns and associated products with great success. The company's own airgun – made, with the exception of the barrel blanks and the wood stocks, in Hailsham and Newhaven – was conceived in 1976 by Richard Marriott-Smith and the first of the distinctive sidelever-cocking Jackals appeared a mere 14 months later. The company also distributes Benjamin, Crosman, Sheridan, and some Italian and Chinese airguns, through its retail outlets in Hailsham, London and Manchester.

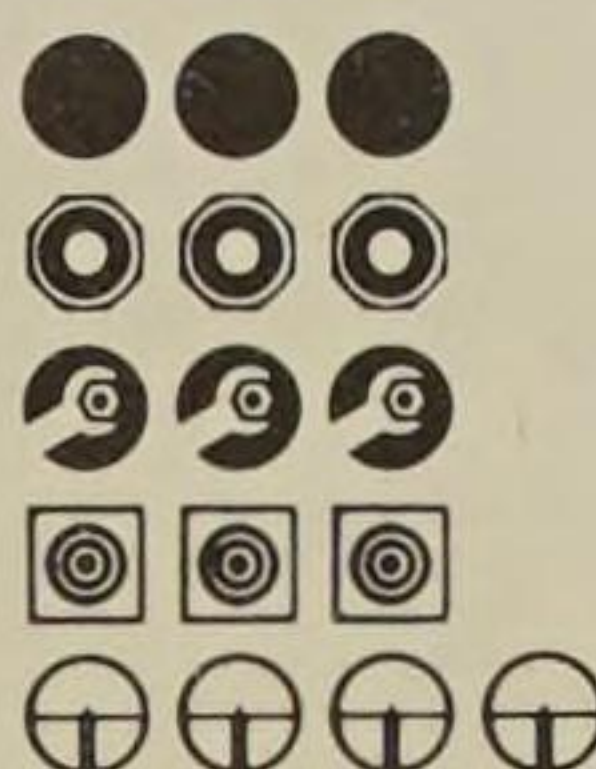
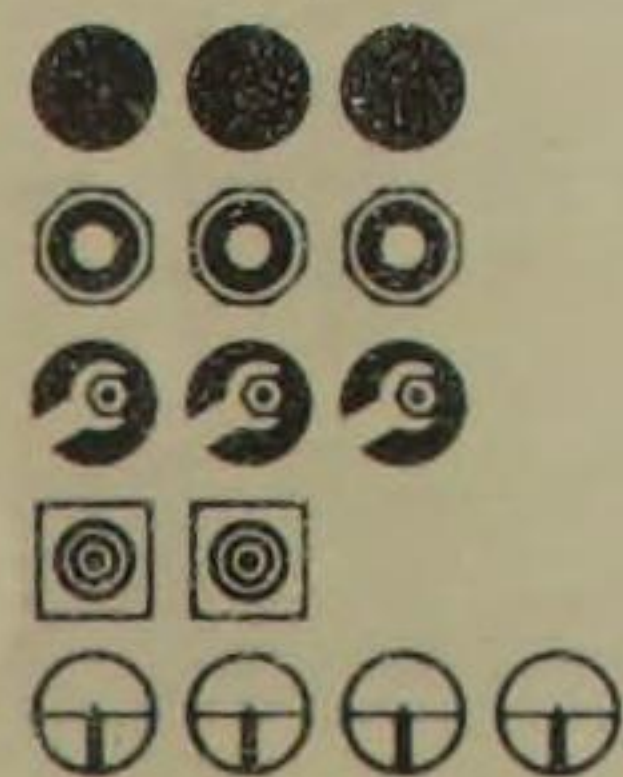
Jackal AR7

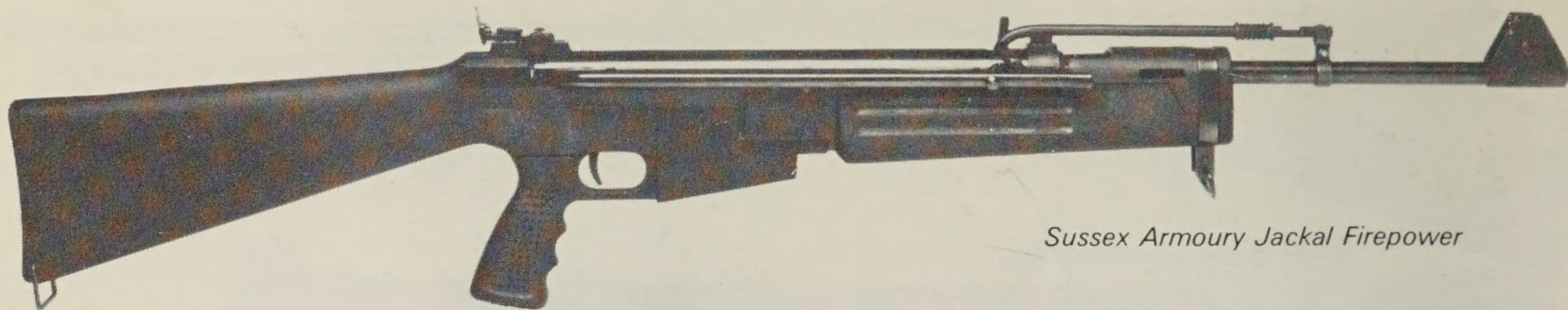
This short-barrelled Hi-Power, with a simulated flash-hider, was introduced in the spring of 1978. The front sight lies immediately in front of the loading tap, with the standard plastic back sight above the cylinder end cap – though the AR7 was originally fitted with the now discontinued Singlepoint SP220 and had no fixed sights. Despite its short barrel, neither accuracy nor velocity suffers; firing, however, is extremely noisy. *Type*, fixed-barrel sidelever-cocking spring-air rifle, loaded through a rotary tap; *cl*, R1/R2; *cal*,

5.5/0.22; *loa*, 886/34.9; *bl*, 200/7.9; *rf*, 6R; *wt*, 3.27/7.21; *ps*, synthetic O-ring; *sft*, automatic.

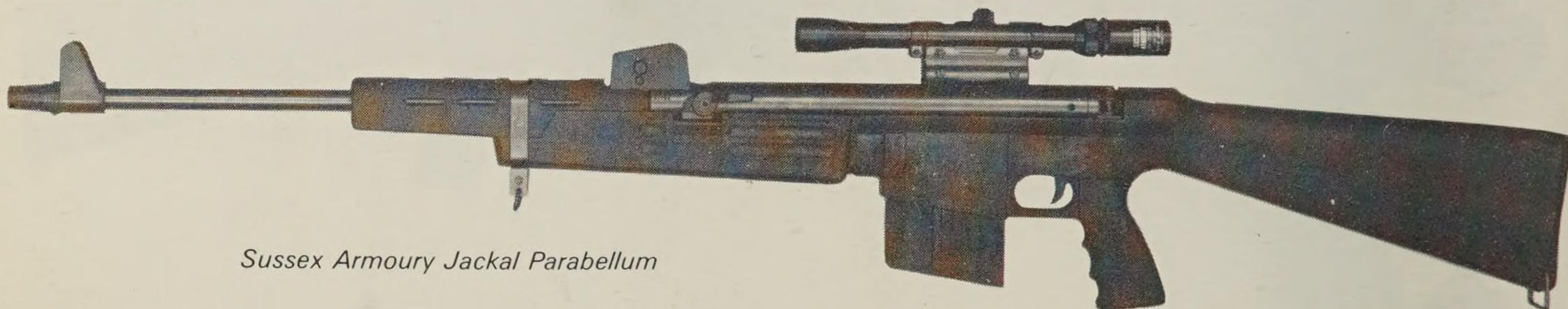
Jackal Hi-Power

Introduced in the summer of 1979, the perfected Sussex Armoury rifle incorporates a slightly modified version of the original Parabellum mechanism. It is quite well finished, though the design of the ideally-placed sidelever-retaining catch could be bettered. A ratchet safety prevents the sidelever spring closing during the cocking stroke. The conventional rotary loading tap has a tough plastic lever, which lies on the front right side of the receiver. The distinctive injection-moulded military-style ABS stock, which facilitates control during firing, follows the fashionable 'straight line' layout, and the sight line, therefore, is rather low. It suffers resonance problems on firing, a drawback peculiar to hollow synthetics but which may be minimized by filling with styrene foam. The limited vertical movement of the back sight is compensated by the unique adjustable reverse-taper front sight. Despite a few flaws, the Hi-Power is powerful (about 600fs, 185ms) and its Hämmerli-made barrel gives good accuracy. *Type*, fixed-barrel sidelever-cocking spring-air rifle, loaded through a rotary tap; *cl*, R1/R2; *cal*, 5.5/0.22; *loa*, 1,023/40.3; *bl*, 374/14.7; *rf*, 6R; *wt*, 3.37/7.43; *ps*, synthetic O-ring; *sft*, automatic.

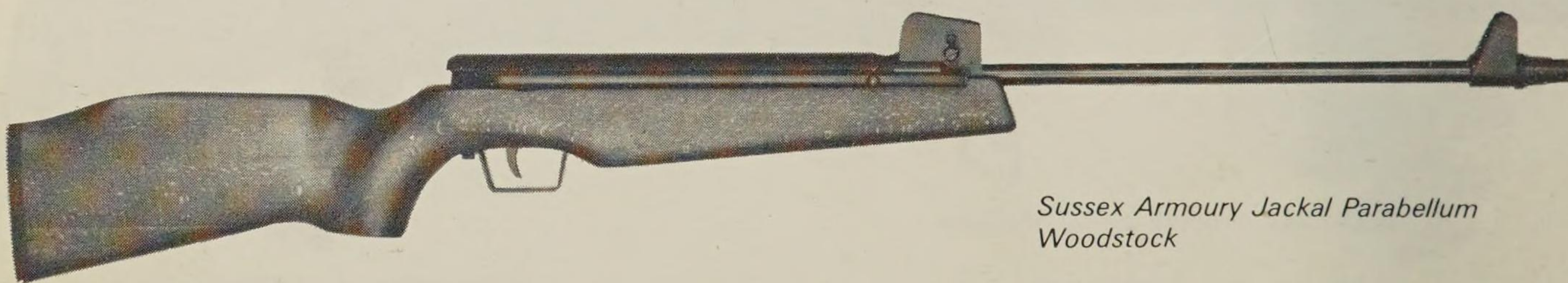




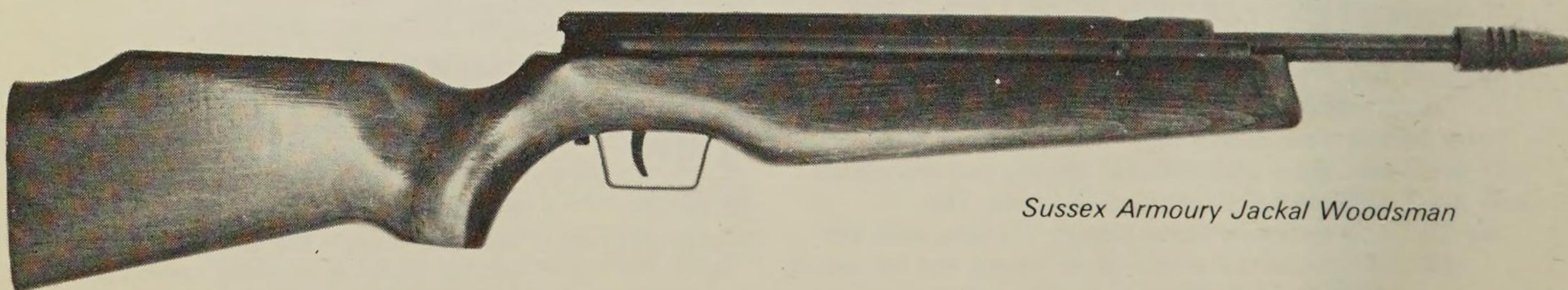
Sussex Armoury Jackal Firepower



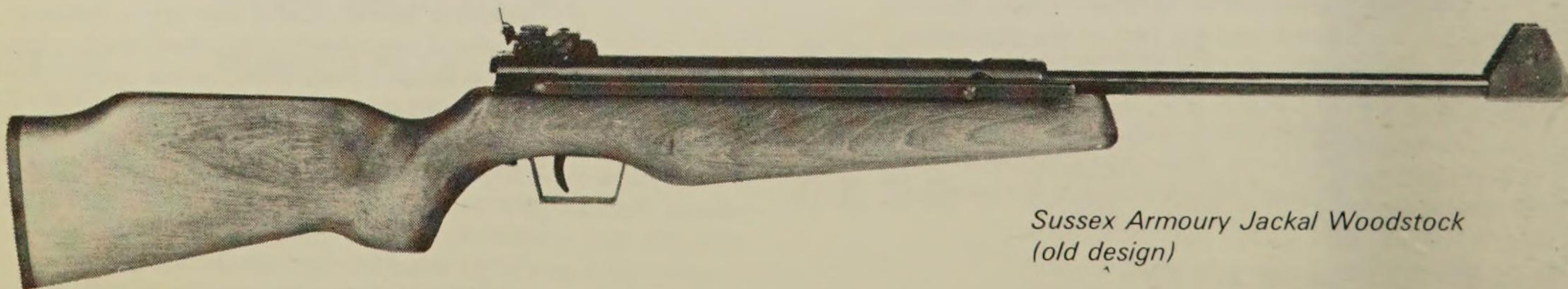
Sussex Armoury Jackal Parabellum



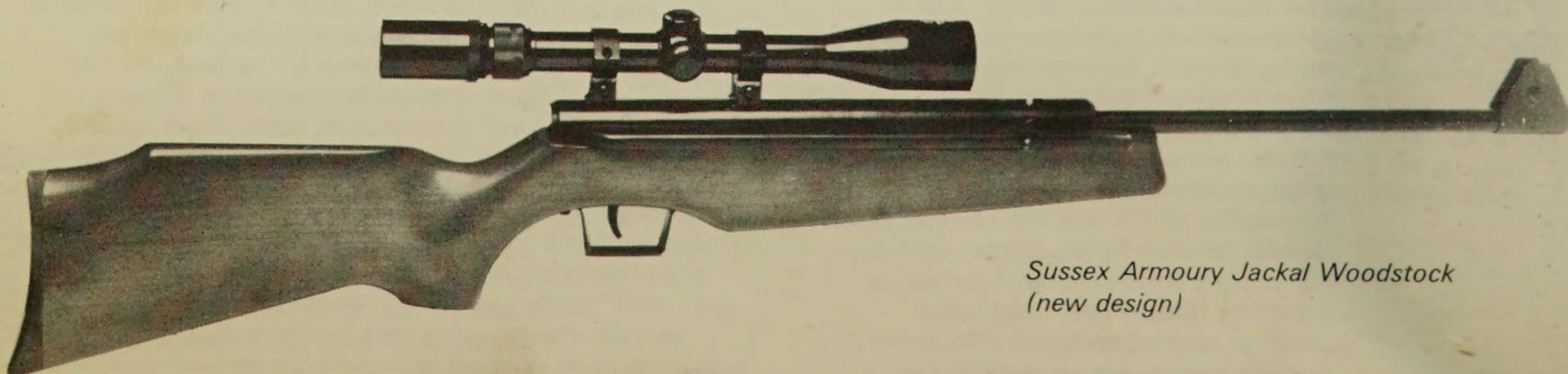
*Sussex Armoury Jackal Parabellum
Woodstock*



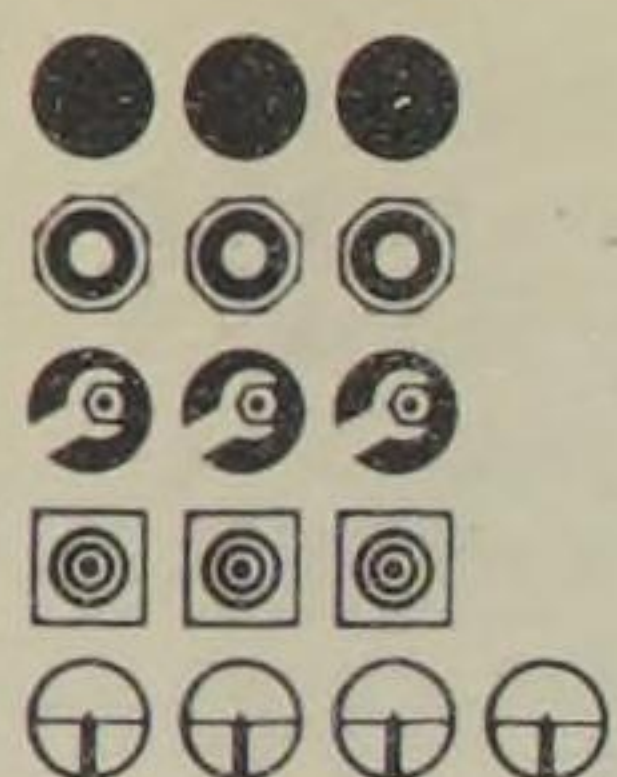
Sussex Armoury Jackal Woodsman



*Sussex Armoury Jackal Woodstock
(old design)*



*Sussex Armoury Jackal Woodstock
(new design)*



Jackal Firepower

This magazine version of the standard HP was introduced late in 1980. It is distinguished by a tube running forward above the breech. This feeds diabolo pellets into the loading port when the barrel is elevated and the breech opened, with a cam on the rotary loading plug acting as an interrupter. The magazine holds up to 30 pellets.



Jackal Parabellum

The original Sussex Armoury pseudo-military airgun appeared in the summer of 1977, with a longer barrel and stock than the current though mechanically similar Hi-Power. The Jackal's most distinctive features are the step in front of the band around the plastic fore-end, the back sight in prominent protectors ahead of the loading tap and the slender front sight support. *Type*, fixed-barrel sidelever-cocking spring-air rifle, loaded through a rotary tap; *cl*, R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,146/45.1; *bl*, 457/18.0; *rf*, 6R; *wt*, 3.42/7.54; *ps*, synthetic O-ring; *sft*, automatic.



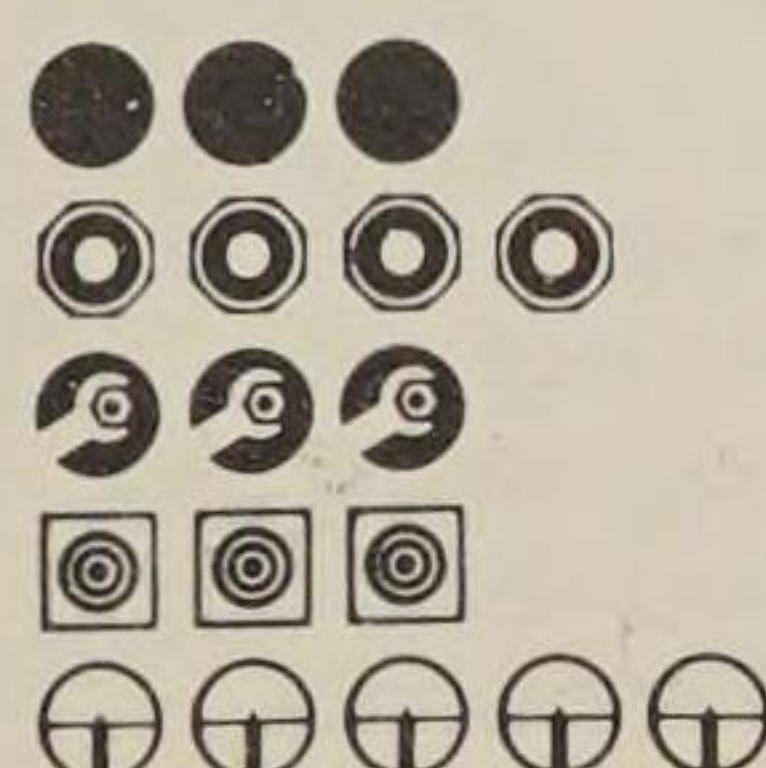
Jackal Parabellum Woodstock ('Jackal Target')

This short-lived version of the Jackal Parabellum, dating from 1977, has a conventional wood stock, pistol grip and cheekpiece. The back sight and long barrel are its principal distinguishing features.



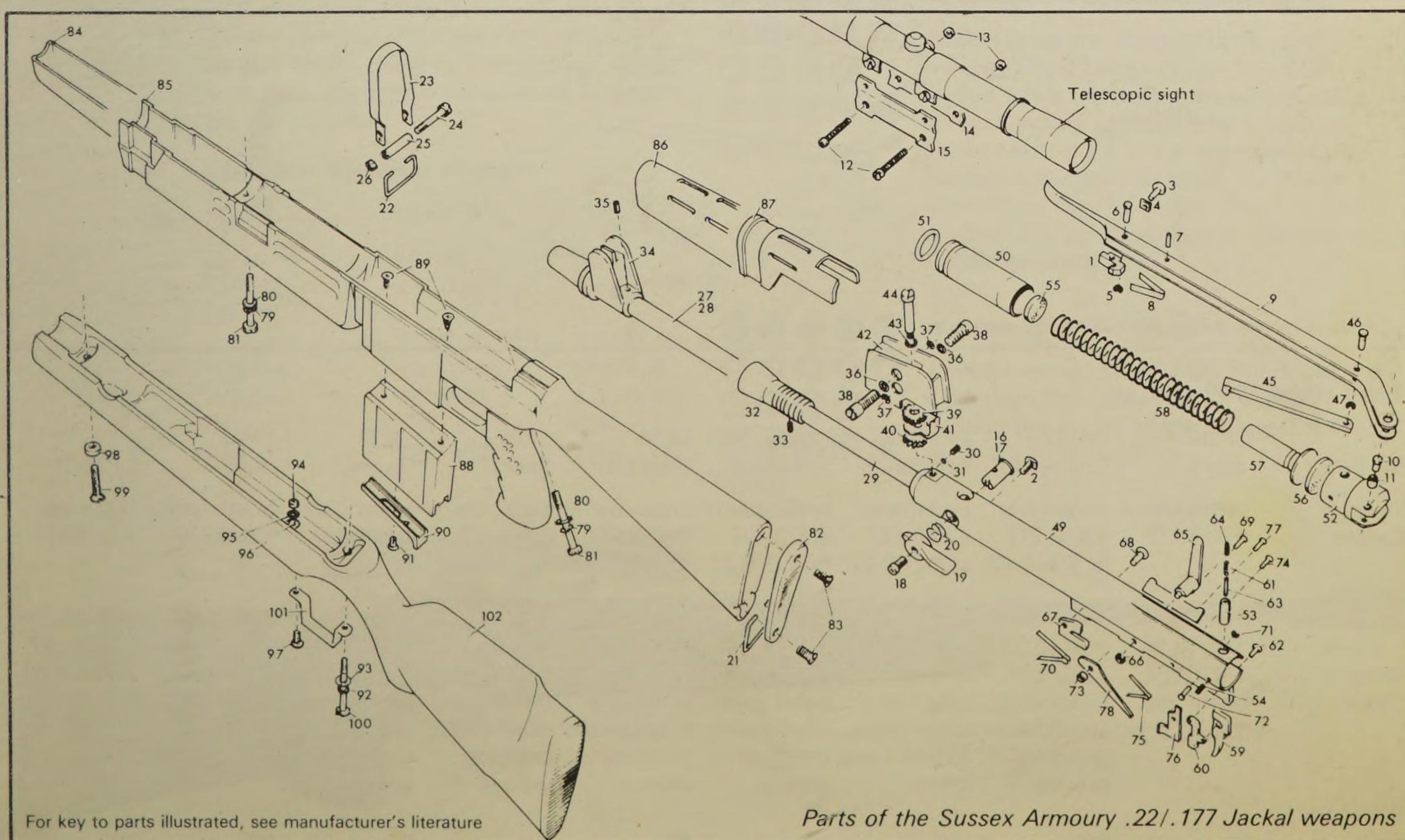
Jackal Woodsman

This trim and compact wood-stocked version of the short-barrelled AR7, despite its 'flash hider', is also very noisy to fire. The Woodsman is intended to use a telescope sight, and no open sights are fitted. *Type*, fixed-barrel sidelever-cocking spring-air rifle, loaded through a rotary tap; *cl*, R2; *cal*, 5.5/0.22; *loa*, 864/34.0; *bl*, 200/7.9; *rf*, 6R; *wt*, 3.29/7.25; *ps*, synthetic O-ring; *sft*, automatic.



Jackal Woodstock ('Hi-Power Woodstock')

This Jackal — powerful and handy, though a little expensive — combines the HP action with a conventional wood stock whose design was thoroughly revised in 1979/80. The new Italian-made walnut-finish beech stock displays outstanding quality and handles very well, owing to the compactness of the action and short barrel. The worst feature is the protruding head of the back action-retaining bolt, which lies uncomfortably behind the trigger guard. *Type*, fixed-barrel sidelever-cocking spring-air rifle, loaded through a rotary tap; *cl*, R1/R2; *cal*, 5.5/0.22; *loa*, 1,002/39.4; *bl*, 374/14.7; *rf*, 6R; *wt*, 3.64/8.03; *ps*, synthetic O-ring; *sft*, automatic.



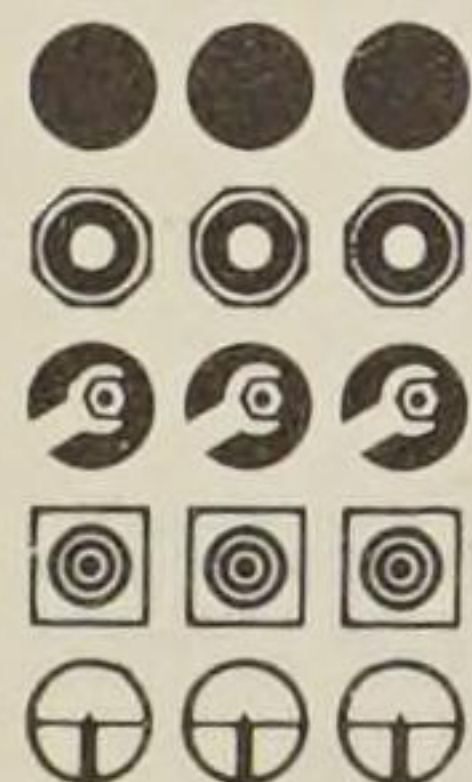
For key to parts illustrated, see manufacturer's literature

Parts of the Sussex Armoury .22/.177 Jackal weapons

TELLY (RELUM)

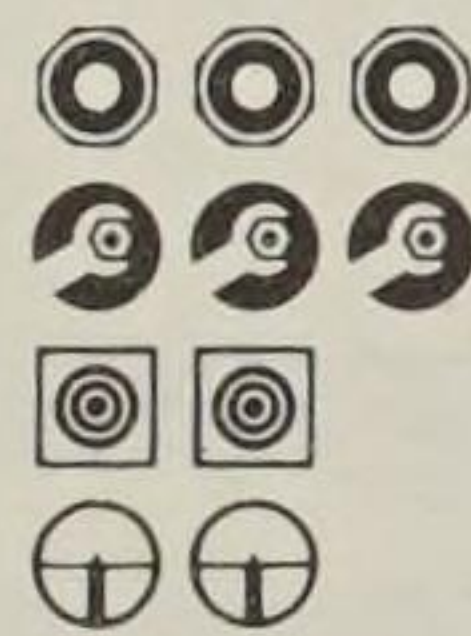
Exporter: Artex, POB 167, H-1390
Budapest, Hungary; UK distributor: Relum
Ltd; US distributor: none. Standard
warranty: unknown.

These guns are often seen, yet their history is confused and obscure. A variety of barrel-cockers and underlever designs has been made since the 1950s, details of some being summarized below. The short-lived sidelever-cocking rifle lacked a safety device and was rapidly withdrawn from the British market.



LG15V (Super Tornado)

This, the best of the current Telly products, exhibits a conventional but rather clumsy cocking link system. Features include double concentric mainsprings, which give good power from quite a short receiver, and an adjustable trigger. There is an unusual saddle-type back sight whose lateral control runs through the barrel block, while the front sight is a simple hooded



blade. The beech stock has a cheekpiece and a separate butt-plate, though its lines are marred by the stamped-strip trigger guard. *Type*, fixed-barrel underlever-cocking spring-air rifle, loaded through a rotary plug; *cl*, R3/R2; *cal*, 5.5/0.22; *loa*, 1,090/42.9; *bl*, 480/18.9; *rf*, 12R?; *wt*, 3.53/7.78; *ps*, leather washer; *bs*, none; *sft*, none.

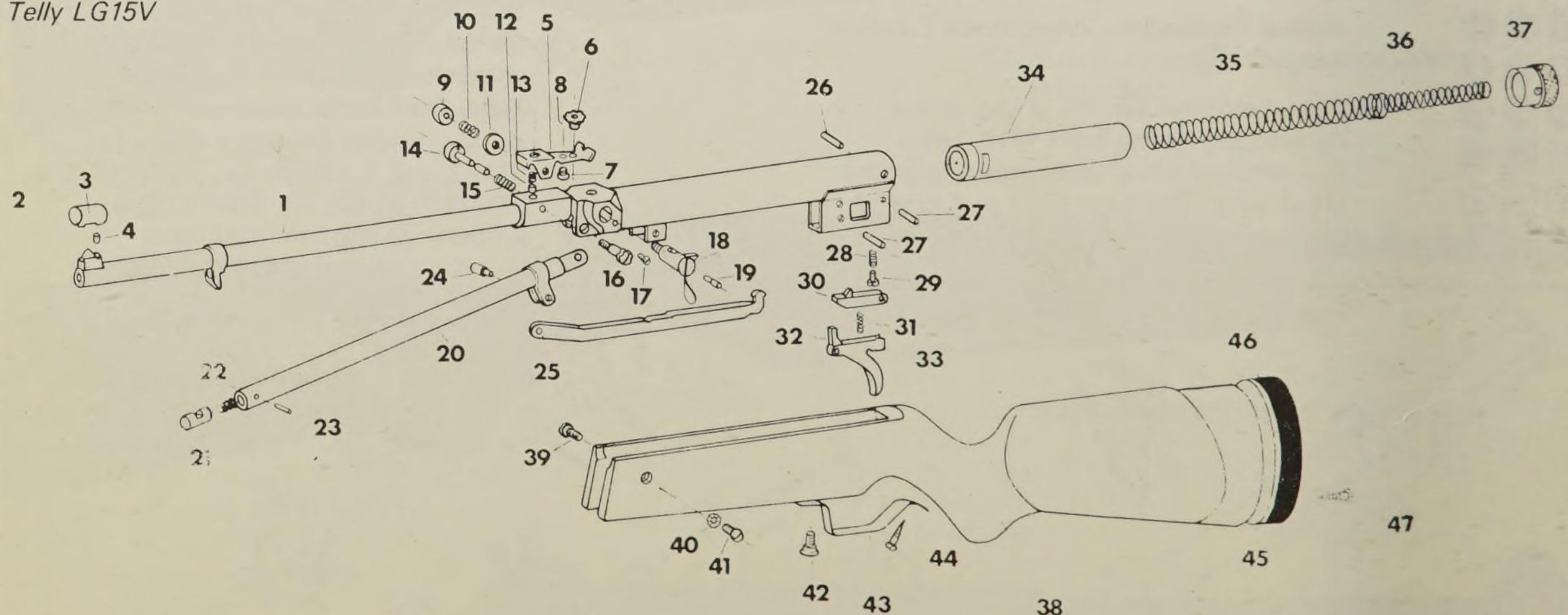
LG422 (Zephyr)

This unsophisticated junior rifle is a smaller version of the more popular Rapide, with a simple trigger, spring assembly and stock. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4; *cal*, 4.5/0.177; *loa*, N/A; *bl*, N/A; *rf*, 12R?; *wt*, N/A; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

LG522 (Rapide)

The 522 shares the sights and some other parts with the LG15V. It features rails for a telescope sight, an adjustable trigger, a guided double concentric mainspring and a simple stock that lacks a butt-plate. *Type*, break-barrel spring-air rifle, detent-locked

Telly LG15V



For key to parts illustrated, see manufacturer's literature

Telly rifles 1960–70

Model	LP10 Boy's	LP11A Champion	LP11B Champion	LP22 Standard	LP24 Repeater	LP25 Sport	LP27 Super	LP29 Junior	LP35(?)
Type	break-barrel	underlever	underlever	break-barrel	break-barrel	break-barrel	break-barrel	break-barrel	sidelever
Calibre	4.5/0.177	4.5/0.177 or 5.5/0.22	4.5/0.177 or 5.5/0.22	4.5/0.177 or 5.5/0.22	4.5/0.177 or 5.5/0.22	5.5/0.22	4.5/0.177	4.5/0.177	4.5/0.177
Length									
overall	910/35.49	1,100/43.29	1,150/44.85	970/37.83	980/38.22	1,130/44.07	1,010/39.39	930/36.27	930/36.27
barrel	350/13.65	470/18.33	480/18.72	400/15.60	400/15.60	520/20.28	400/15.60	350/13.65	330/12.87
Weight	1.80/3.97	3.15/6.95	3.40/7.50	2.30/5.07	2.50/5.51	2.95/6.50	2.80/6.17	2.10/4.63	2.10?/4.63
Stock	pistol grip	pistol grip, cheekpiece, grasping groove	pistol grip, cheekpiece, Monte Carlo comb	pistol grip, cheekpiece, grasping groove	pistol grip, cheekpiece, grasping groove	pistol grip, cheekpiece, grasping groove	pistol grip, cheekpiece, grasping groove	pistol grip	pistol grip
Telescope sight	no	yes	yes	no	no	yes	no	no	no

(bolt); *cl*, R3; *cal*, 5.5/0.22; *loa*, 952/37.5; *bl*, N/A; *rf*, 12R?; *wt*, 2.27/5.01; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.



LG527 (Taurus)

This gun is a minor derivative of the Rapide, distinguished principally by its longer barrel. Some guns may be encountered with cheekpieces on the butt, but most are plain-stocked. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R4; *cal*, 5.5/0.22; *loa*, 1,015/40.0; *bl*, N/A; *rf*, 12R?; *wt*, 2.30/5.07; *ps*, leather washer; *bs*, synthetic O-ring; *sft*, none.

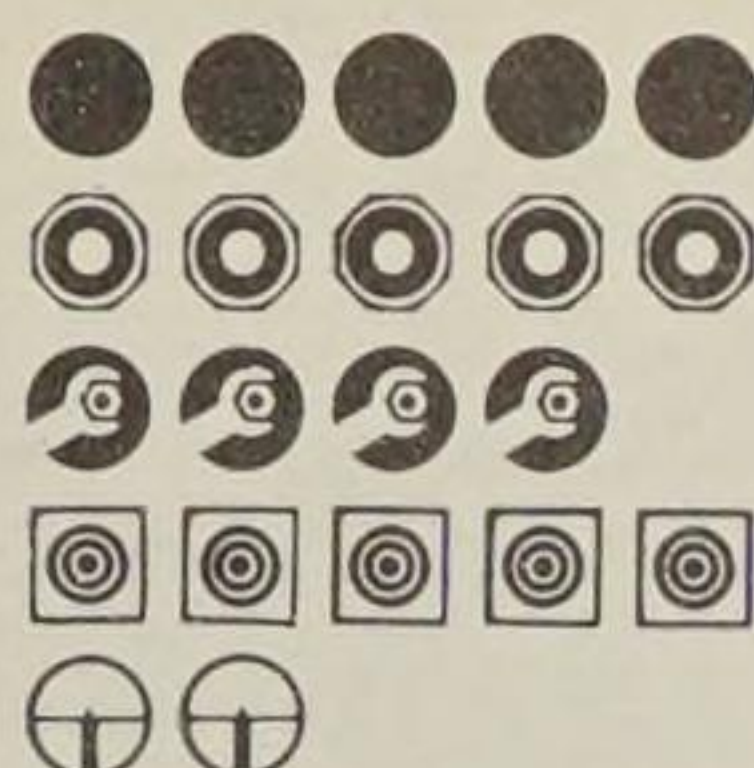
WALTHER

Carl Walther GmbH, D-7900 Ulm/Donau, Wilhelmstrasse 28 (Postfach 4325), West Germany. UK distributor: Accuracy International Ltd.; US distributor: Interarms (some guns available through Beeman's Precision Airguns); Standard warranty: 12 months.

Walther was founded in Zella St Blasii in 1886 and made target rifles for the remainder of the nineteenth century. However, a successful automatic pistol was marketed from 1911 onwards and many cartridge pistols followed until 1945. The firearms business was re-established in Ulm, where production of an airgun, designed in 1950, began in 1951; a pistol followed in 1952 and airguns have since been made without a break – including the world-renowned single-stroke pneumatic recoilless LGR competition rifle, which has proved a worthy competitor for the Feinwerkbau. Despite claims made to the contrary, there is no evidence that Walther made airguns in the pre-1939 era.

Obsolete Walther airguns

Model	LGV	LP2
Class	M3:R4	C2
Calibre	4.5/0.177	4.5/0.177
Length		
overall	1,050/40.95	335/13.07
barrel	450/17.55	240/9.36
Weight	3.9/8.60	1.30/2.87
Rifling	12R	12R
Date	1963 – 68	1965 – 71

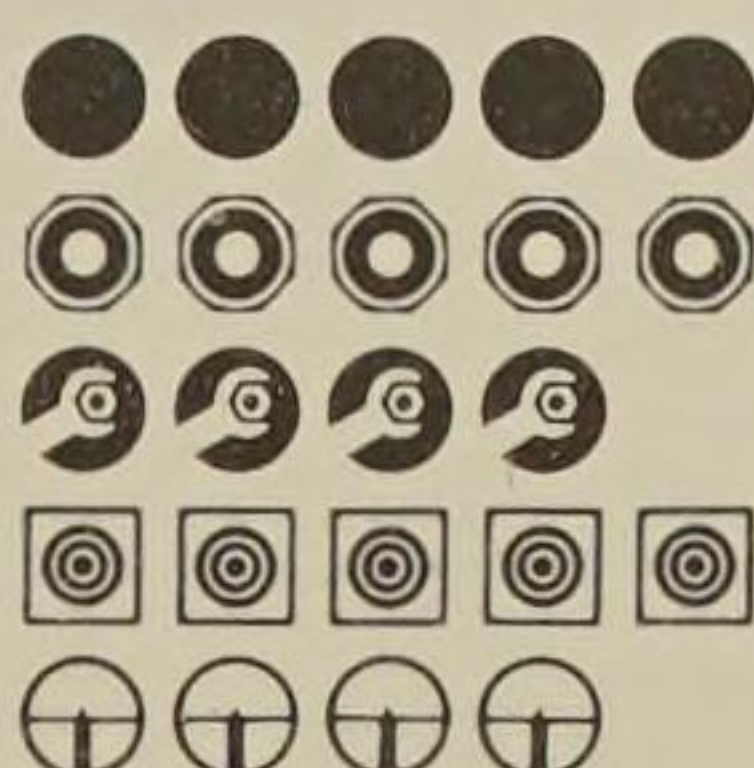


Walther LGR

The Walther Ruckstossfreie-Luftgewehr (recoilless rifle) vies with the Feinwerkbau for the title of the world's most successful rifle. After lengthy gestation, the LGR first appeared in 1974. It is a sophisticated single-stroke pneumatic, operated by a sidelever that compresses air into the valve chamber on its forward stroke; loading is effected through the distinctive double-seal cam-locked breech block, a component that gave considerable trouble during development. There are standard replaceable-element tunnel-pattern front and aperture back sights of the highest quality, and a fully adjustable trigger. The standard LGR has a low-comb competition stock with stippling on the pistol grip and the extreme tip of the fore-end. The air compression stroke is noticeably more taxing than the Feinwerkbau cocking system, but the Walther is simple, consistent and almost totally recoilless. Only the valve-release striker and the pellet move on firing. *Type*, recoilless sidelever-cocking single-stroke pneumatic rifle; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,115/43.9; *bl*, 500/19.7; *rf*, 12R; *wt*, 4.91/10.82 with sights; *ps*, PTFE washer; *bs*, 2 synthetic O-rings; *sft*, automatic.

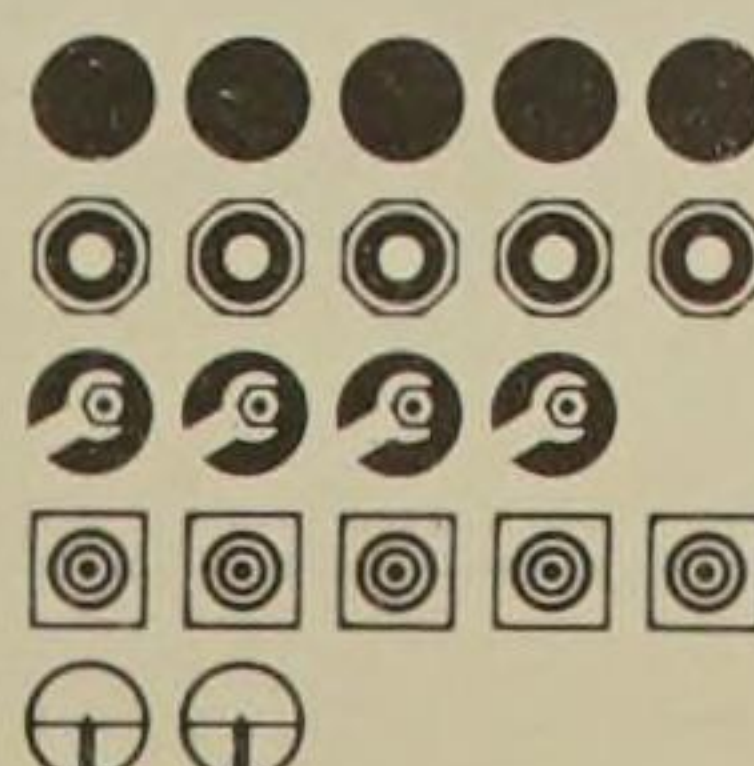
Walther LGR Junior

This is a derivative of the standard LGR (qv), shorter, lighter, and a little cheaper.



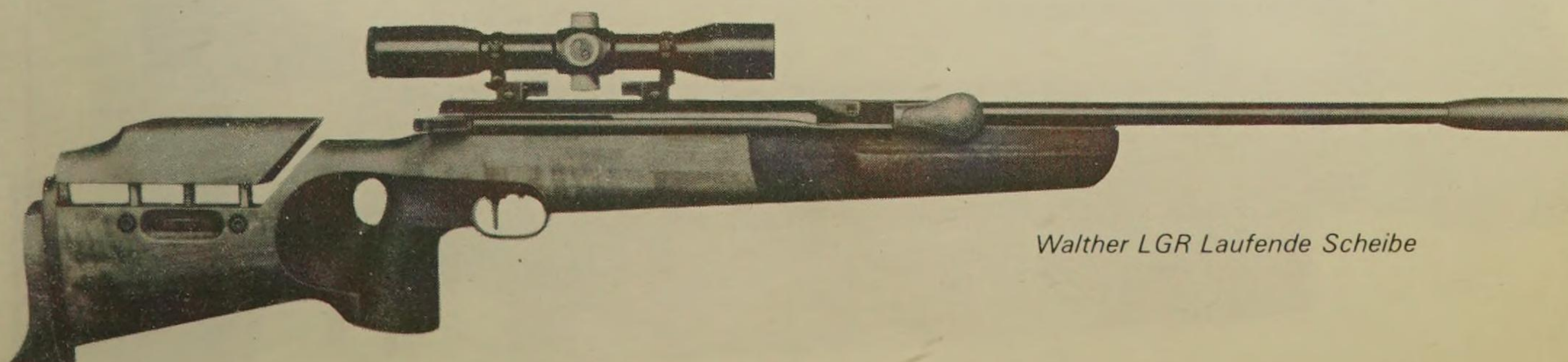
Walther LGR Laufende Scheibe

Designed for the comparatively new moving-target competitions, this LGR variant has a distinctive thumbhole stock, a screw-elevated variable height comb, a hooked butt-plate and a telescope sight (usually a Bushnell Scopechief, though alternatives may be fitted). The fore-end is stippled and swells slightly to facilitate grip. Details generally as LGR.

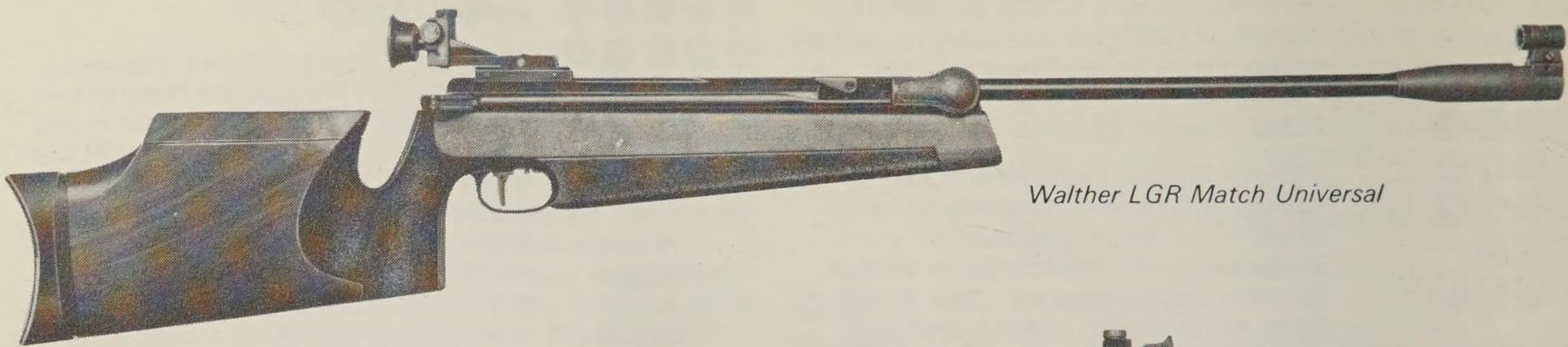


Walther LGR Match

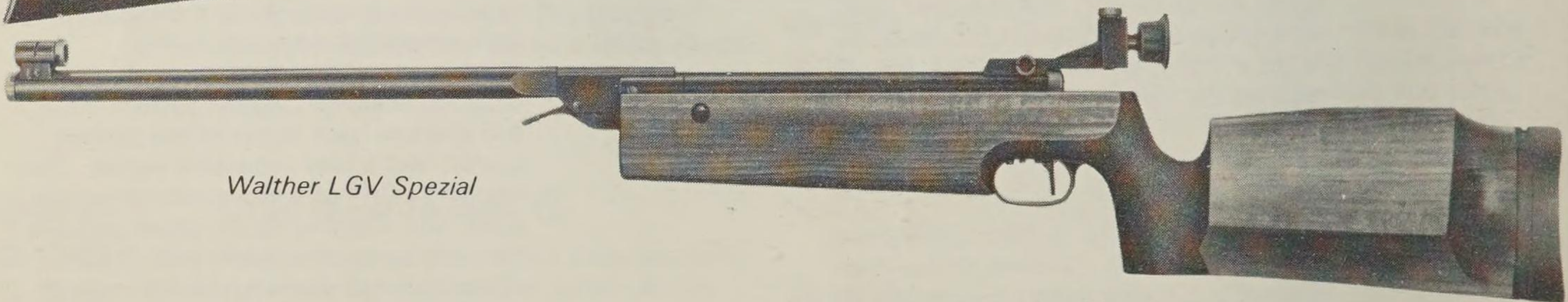
A minor variant of the LGR, the Match has a different high-comb stock, and stippling running the length of the fore-end. Details generally as for LGR.



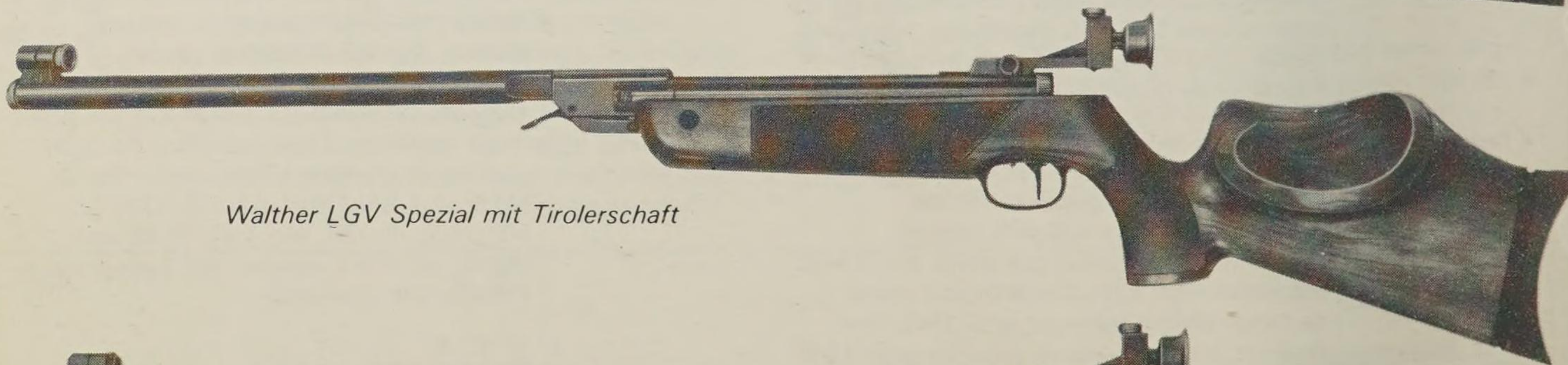
Walther LGR Laufende Scheibe



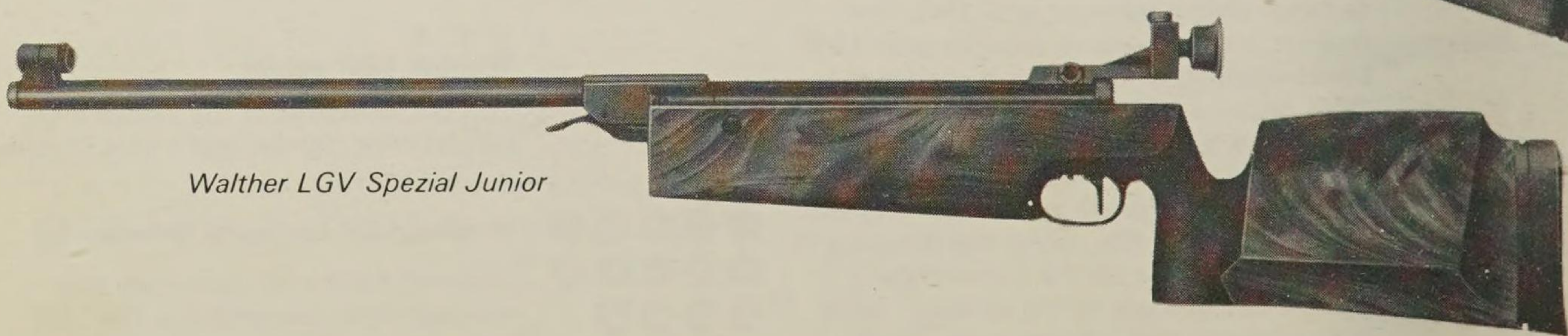
Walther LGR Match Universal



Walther LGV Spezial



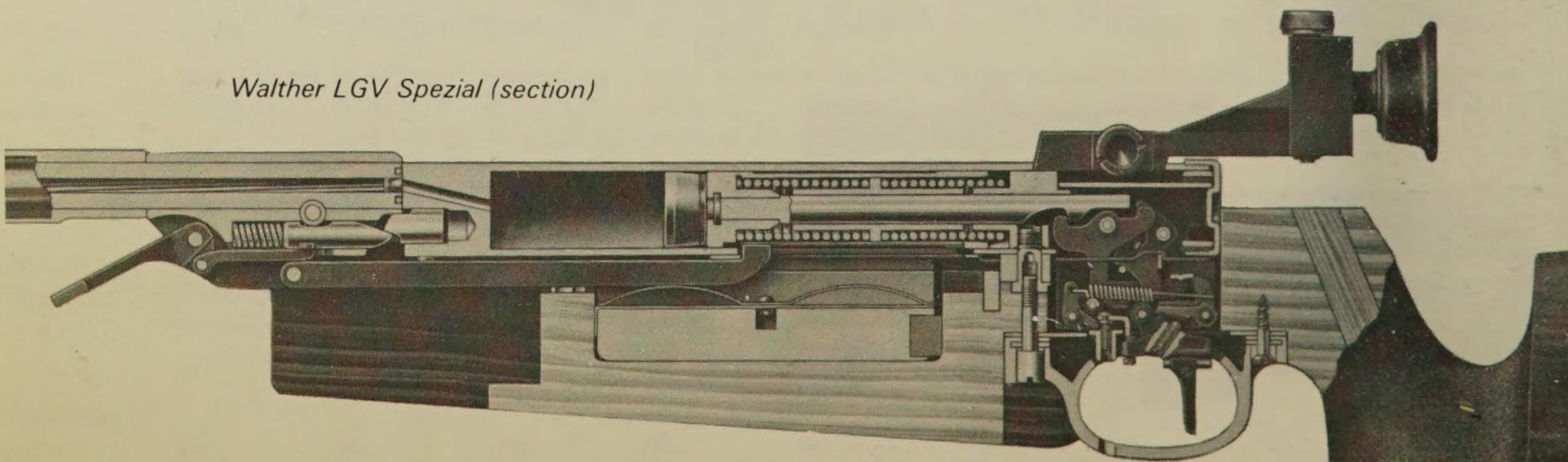
Walther LGV Spezial mit Tirolerschaft



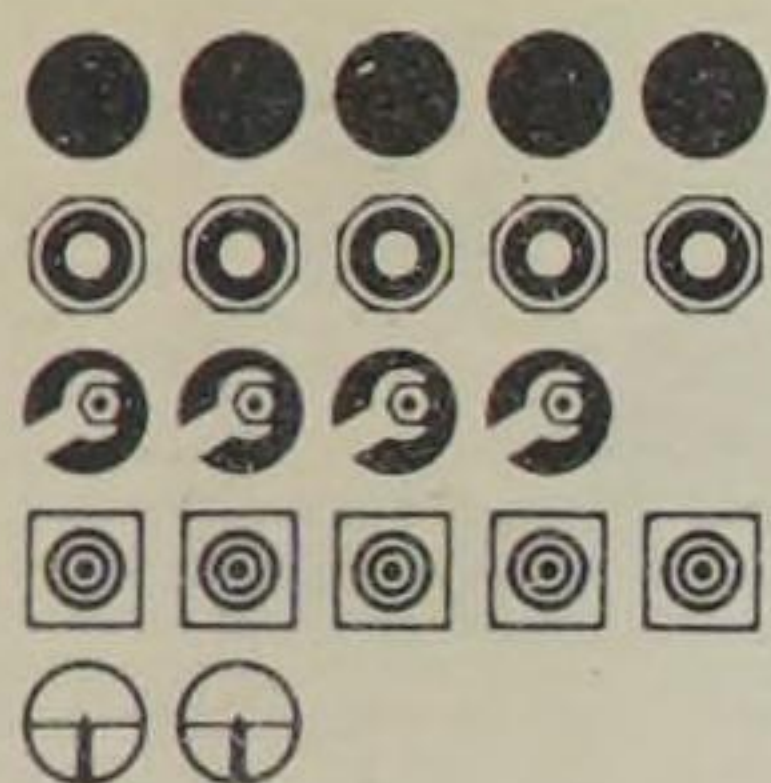
Walther LGV Spezial Junior



Walther LGV Spezial Junior 'Dreistellungskampf'

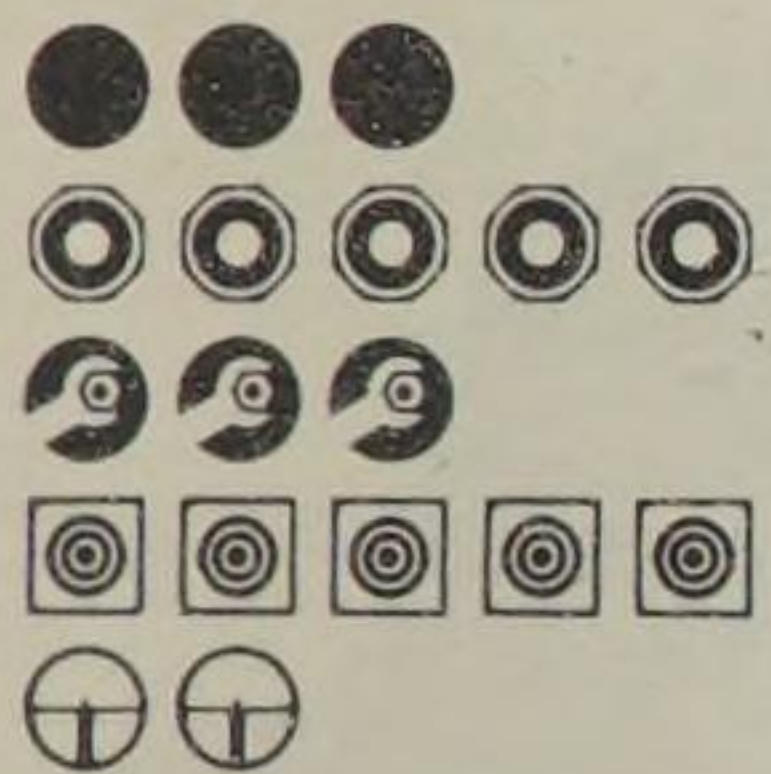


Walther LGV Spezial (section)



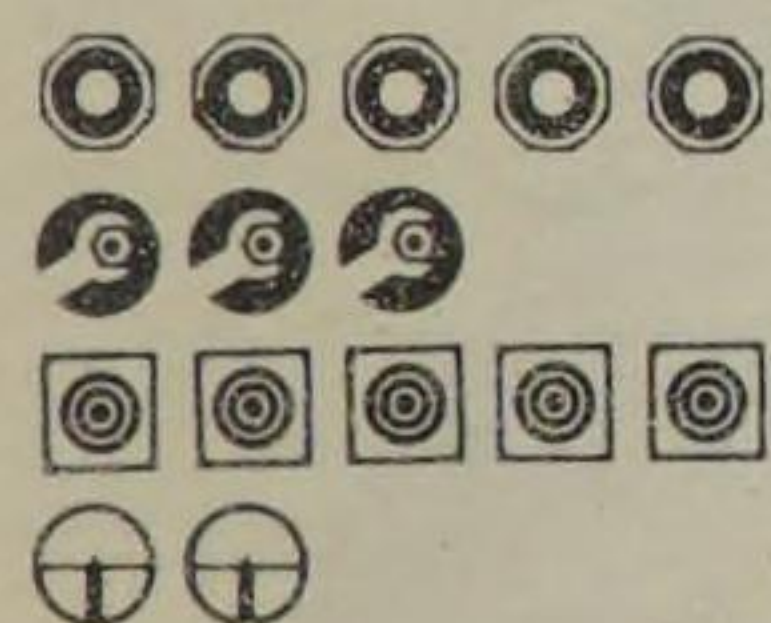
Walther LGR Match Universal

Intended for a wide range of shooting, this rifle is distinguished by its butt which may be fitted with several interchangeable variable-height combs. It is otherwise an LGR Match. Details generally as for LGR.



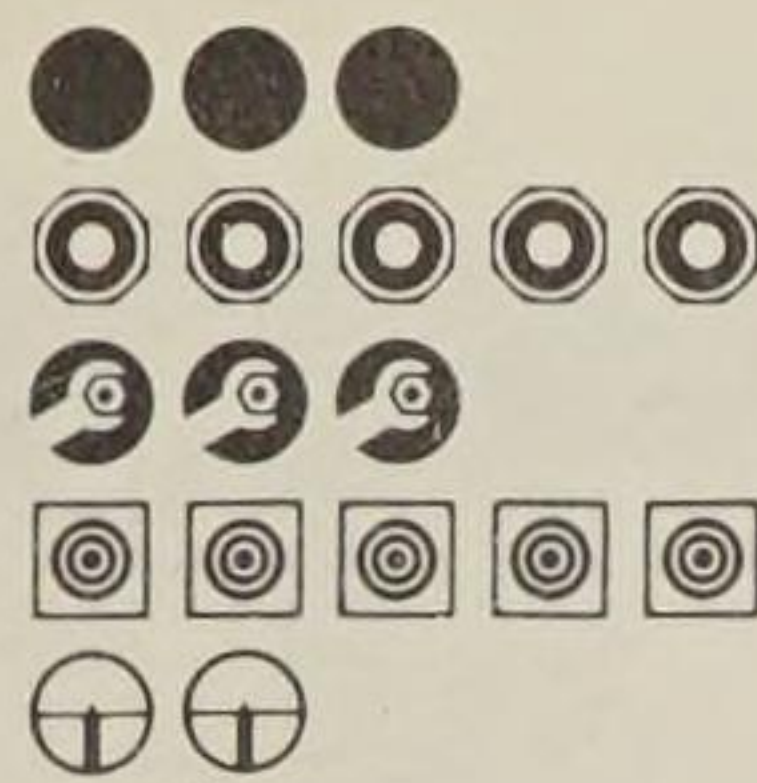
Walther LGV Spezial

This revision of the LGV dates from 1968 and originally had a rounded stock, though a squared pattern was substituted in 1972. The LGV Spezial has two short counterwound mainspring elements, giving improved reliability, while a flat spring in the stock — above the auxiliary weight — eliminates play in the articulated cocking lever system. The sophisticated trigger mechanism is fully adjustable and there are excellent target sights. The LGV Spezial is the epitome of conventional air-rifle design, with minimal recoil/spring-surge, but it is also extremely expensive. *Type*, break-barrel spring-air rifle, positive lock; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,055/41.5; *bl*, 450/17.7; *rf*, 12R; *wt*, 4.75/10.47 with sights; *ps*, PTFE washer; *bs*, synthetic O-ring; *sft*, automatic.



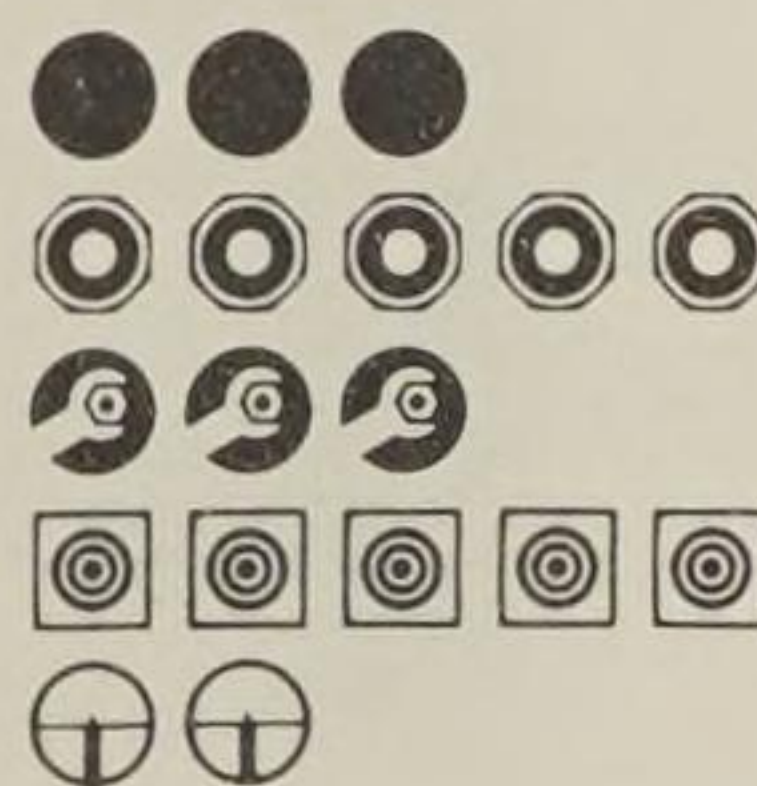
Walther LGV Spezial mit Tirolerschaft

This rarely seen, short-lived LGV Spezial variant (1969 – 73) has a beautifully finished walnut high-comb Tyrolean-style stock, extensively chequered on the fore-end and pistol grip, with a sharply curved fixed rubber butt-plate. *Type*, break-barrel spring-air rifle, positive lock; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,070/42.1; *bl*, 450/17.7; *rf*, 12R; *wt*, 4.30/9.48 with sights; *ps*, PTFE washer; *bs*, synthetic O-ring; *sft*, automatic.



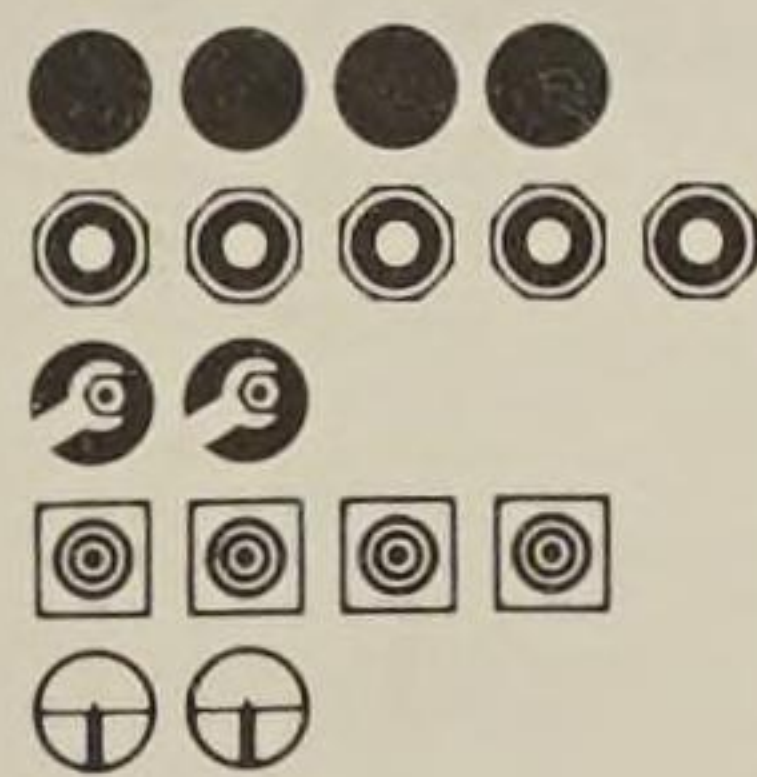
Walther LGV Spezial Junior

This is a smaller version of the LGV Spezial, with a shortened butt and usually lacking the auxiliary fore-end weight. *Type*, break-barrel spring-air rifle, positive lock; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,015/40.0; *bl*, 450/17.7; *rf*, 12R; *wt*, 4.35/9.59 with sights; *ps*, PTFE washer; *bs*, synthetic O-ring; *sft*, automatic.



Walther LGV Spezial Junior 'Dreistellungskampf'

This gun has a special stock adapted to three-position shooting, with a special auxiliary fore-end extension to which a sling anchor point may be fitted. The extension swings sideways to permit barrel-opening. *Type*, break-barrel spring-air rifle, positive lock; *cl*, M1; *cal*, 4.5/0.177; *loa*, 1,015/40.0; *bl*, 450/17.7; *rf*, 12R; *wt*, 4.45/9.81 with sights; *ps*, PTFE washer; *bs*, synthetic O-ring; *sft*, automatic.

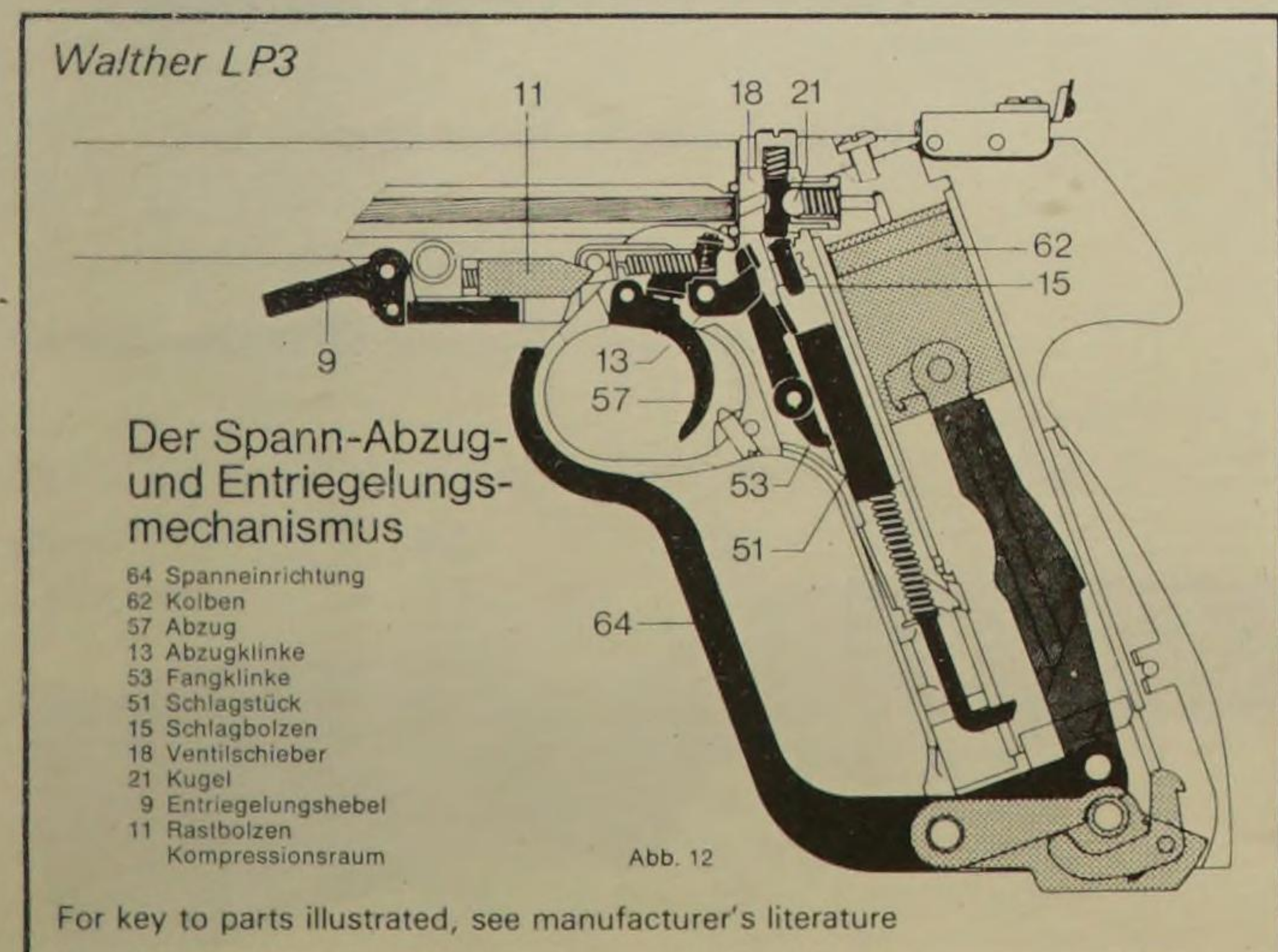


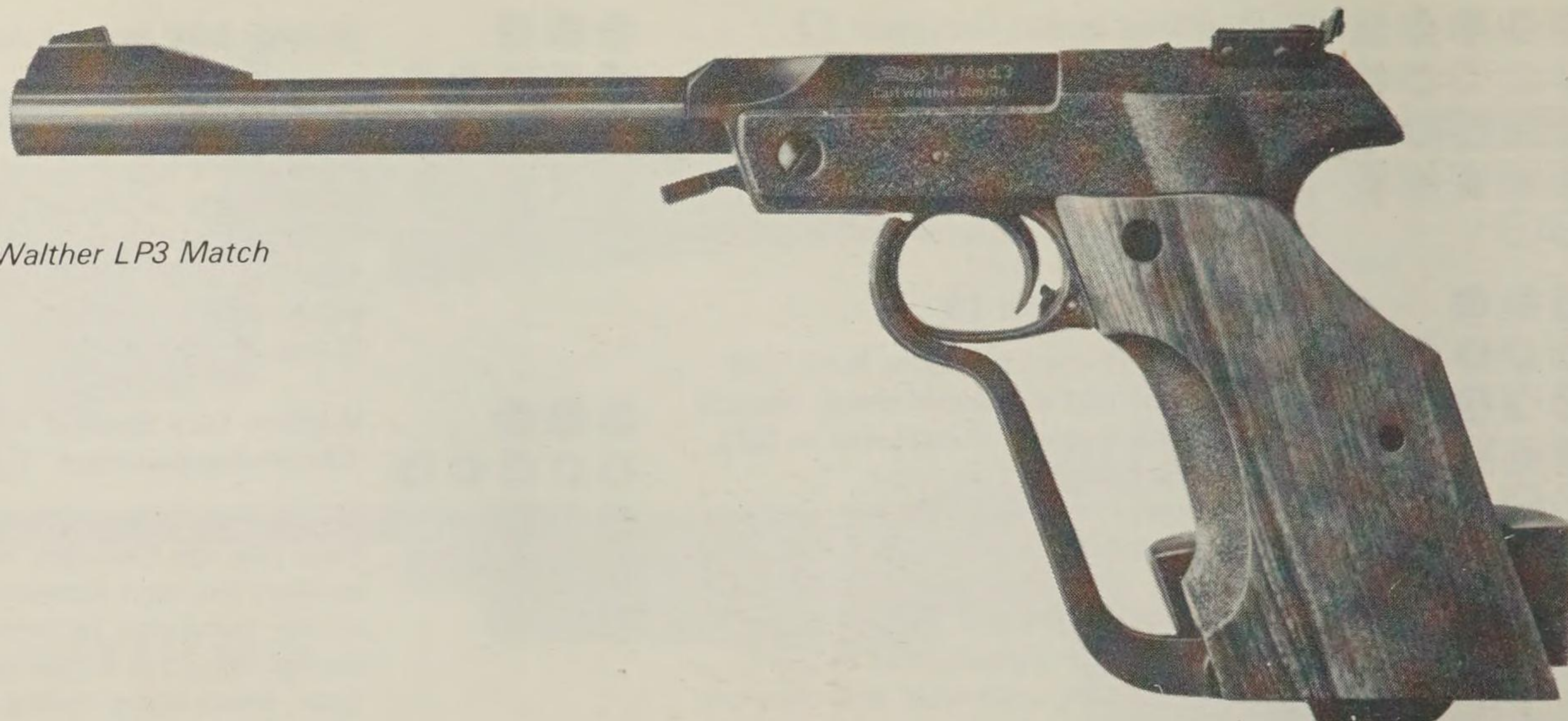
Walther LP3

The LP3 — obtainable with plastic or walnut grips — appeared in November 1971 as a revised LP2 with an improved valving system and a better back sight. Despite changes to the barrel casing in 1978 (which is obvious from comparison of the LP2 and LP3 photographs), the LP3, like its predecessor, has thus far failed to challenge the Feinwerkbau LP65. *Type*, recoilless butt-lever action single-stroke pneumatic pistol; *cl*, C1; *cal*, 4.5/0.177; *loa*, 335/13.2; *bl*, 240/9.4; *rf*, 12R; *wt*, 1.30/2.87; *s*, synthetic; *sft*, automatic.

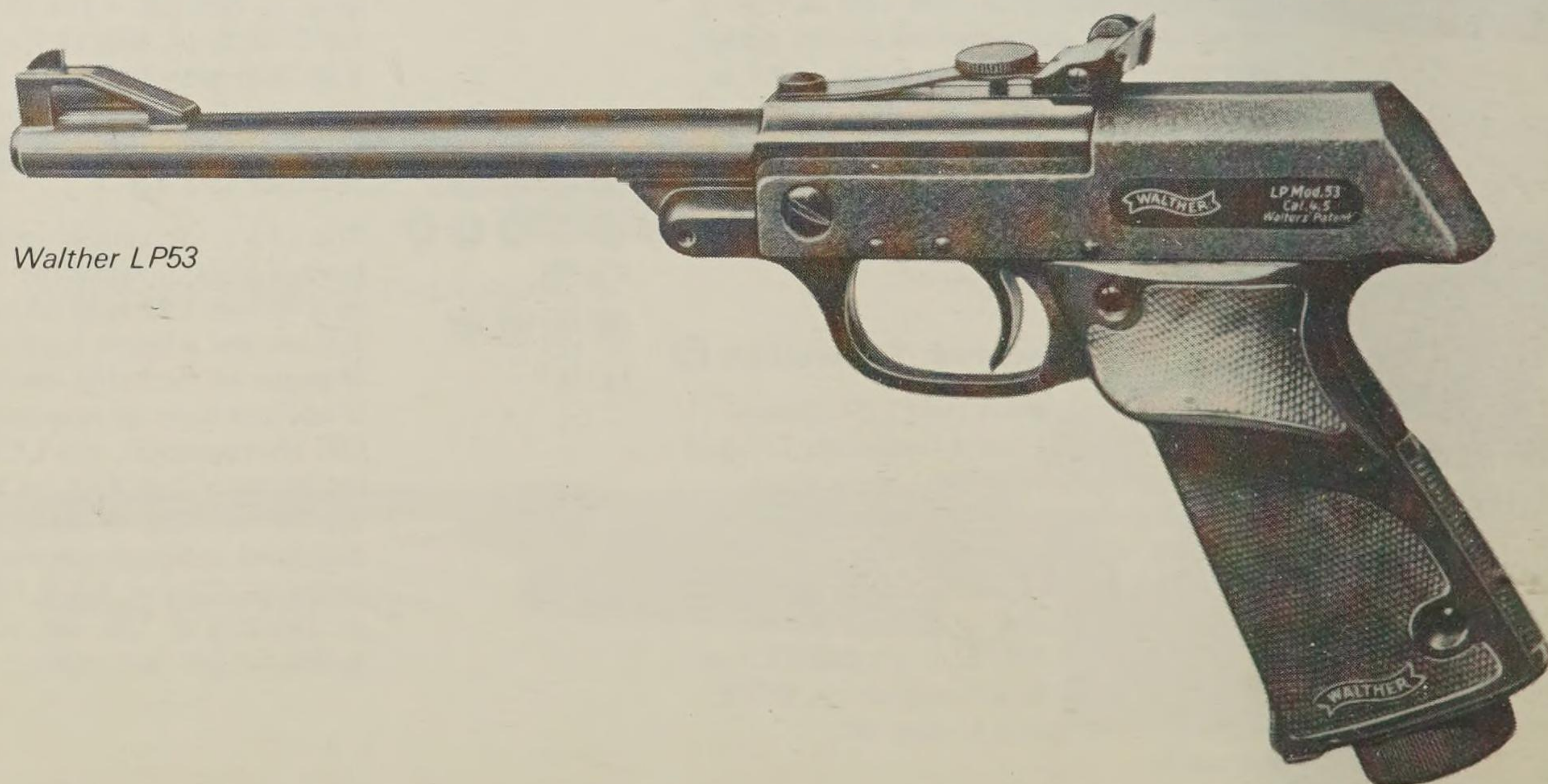


Walther LP3

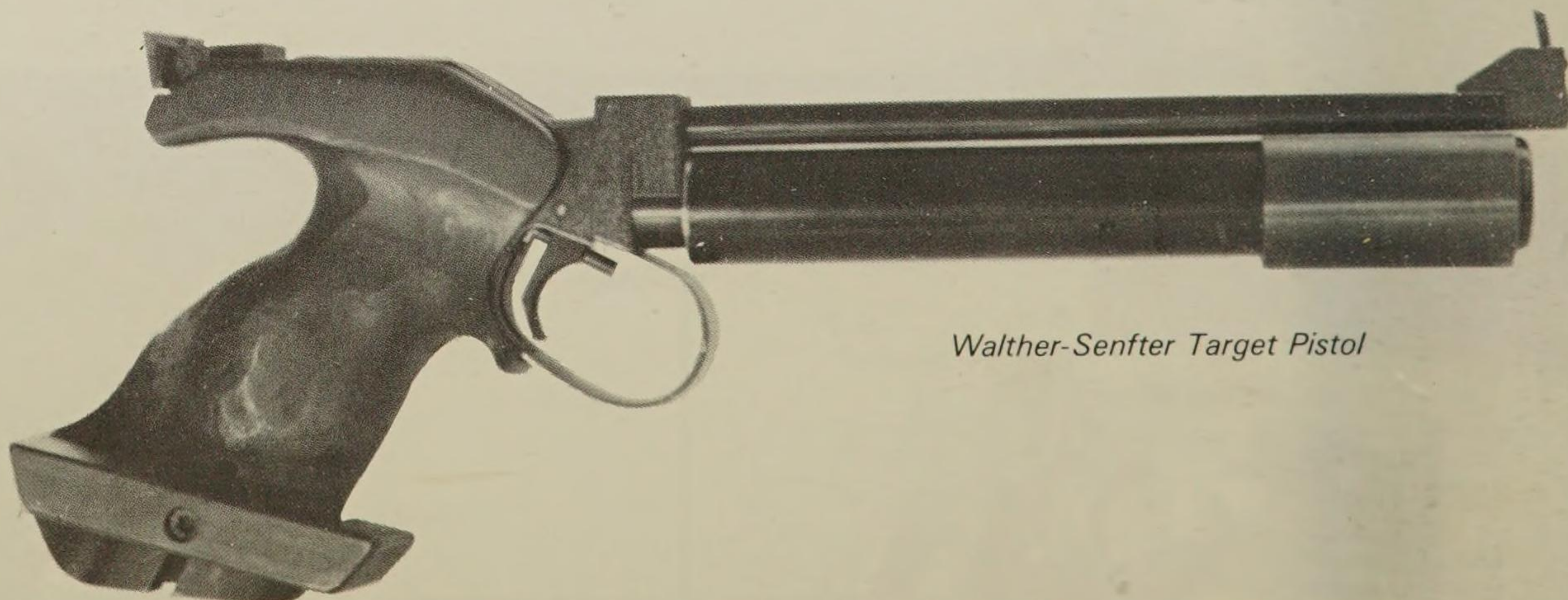




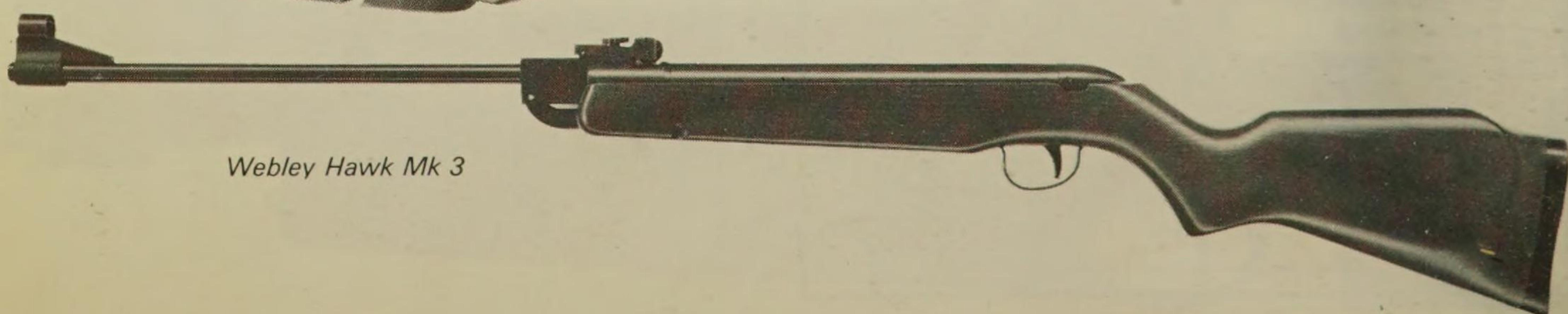
Walther LP3 Match



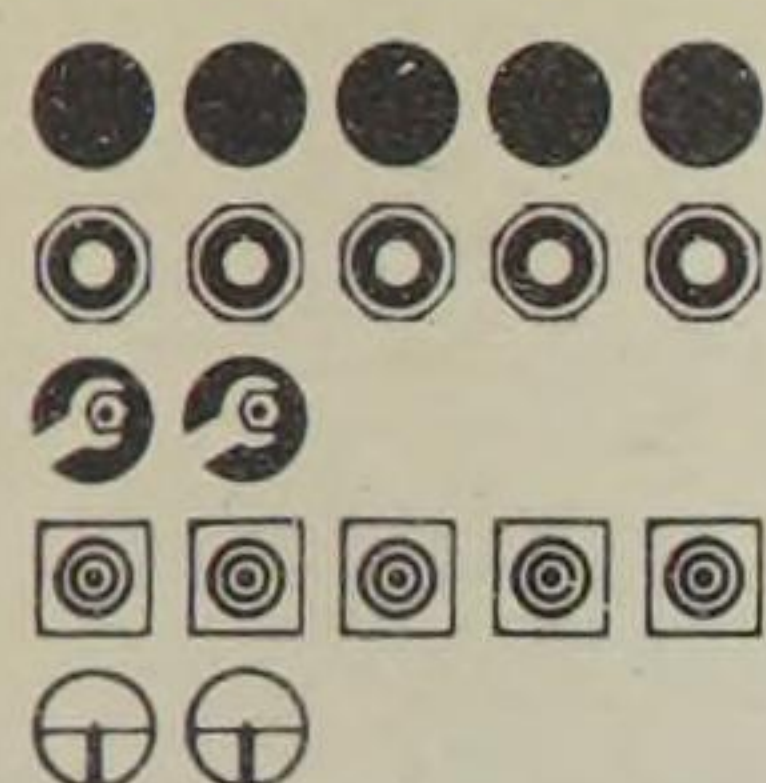
Walther LP53



Walther-Senfter Target Pistol

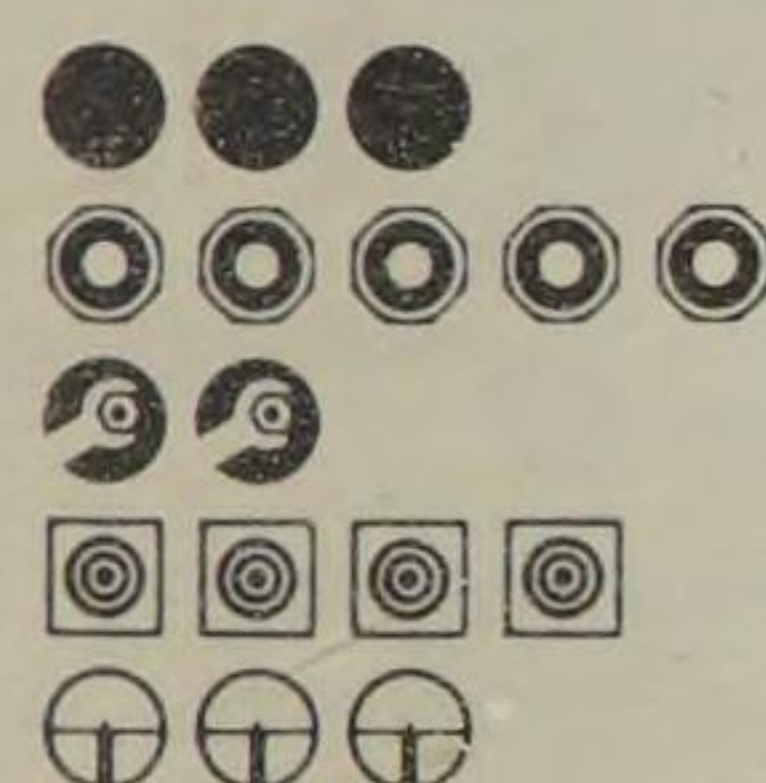


Webley Hawk Mk 3



Walther LP3 Match

This differs considerably from the externally similar LP3, but may be distinguished by the higher cutaway in the frame for the thumb-web, which permits the bore to be lowered in relation to the hand grip. Dating from 1973, the LP3 Match is an elegant single-stroke pneumatic with adjustable palm-rest walnut grips and the standard 'crackle black' finish. A change in the barrel-casing design occurred in 1978, but the revision – the omission of the long top rib – is purely cosmetic. *Type*, recoilless butt-lever action single-stroke pneumatic pistol; *cl*, C1; *cal*, 4.5/0.177; *loa*, 335/13.2; *bl*, 240/9.4; *rf*, 12R; *wt*, 1.36/3.00; *s*, synthetic; *sft*, automatic.



Walther LP53

This popular pistol displays a distinctive butt-mounted air cylinder and a double concentric mainspring assembly. It is a very sophisticated non-recoilless design, owing something to Lincoln Jeffries (1921), and has an automatic safety that prevents piston release until the barrel is closed. The front sight is a replaceable blade and the replaceable-element back sight is, perhaps, its worst feature. The LP53 has an odd firearm-like spring-surge/recoil effect owing to the position of the piston. Production ceased in 1975, though new guns are still available. *Type*, break-barrel spring-air pistol, detent-locked (pawl); *cl*, C3:P4; *cal*, 4.5/0.177; *loa*, 310/12.2; *bl*, 238/9.37, 193/7.6 rifled; *rf*, 12R; *wt*, 1.15/2.54 without auxiliary weight; *ps*, leather or PTFE washer; *bs*, leather or synthetic O-ring; *sft*, automatic.

Walther-Senfter Target Pistol

This carbon-dioxide powered competition pistol, designed by the Austrian Emil Senfter, is to be mass-produced in 1981. Few details of its construction have yet been released.



WEBLEY & SCOTT

Webley & Scott Ltd., Park Lane, Handsworth, Birmingham B21 8LU, England. US distributor: Beeman's Precision Airguns; Standard warranty: 12 months.

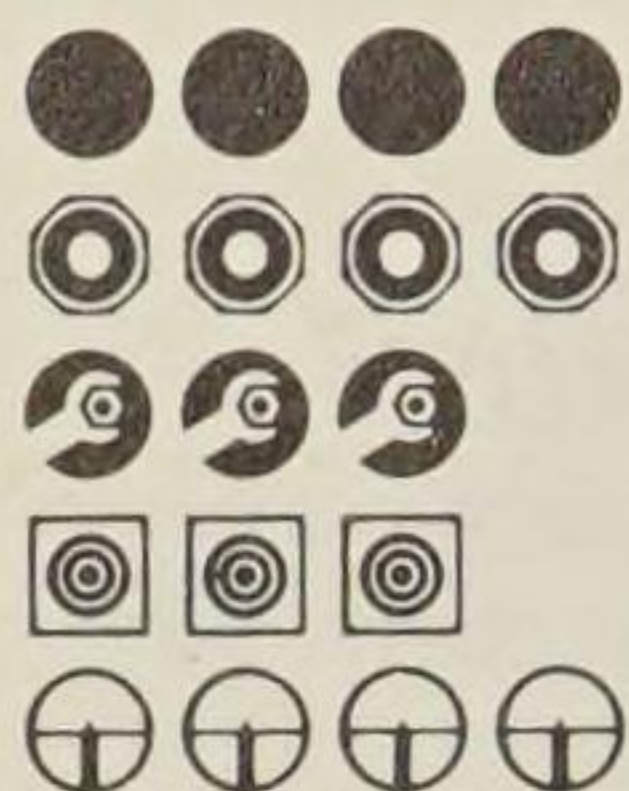
Philip Webley's gunlock-making business was founded in 1838 and became P. Webley & Son in 1859. It amalgamated with W. & C. Scott & Son and Richard Ellis & Sons in 1899 to become the Webley & Scott Revolver & Arms Co. Ltd. By 1906, it had become Webley & Scott Ltd. The company was initially renowned for its cartridge revolvers, but established itself as an airgun manufacturer by exploiting the patent granted to Douglas Johnstone and John Fearn in 1923 (GB 219,872). Variations on this lifting-barrel theme have led through the Junior, Premier and Senior to the modern Hurricane, Tempest and Typhoon. The Mk 2 or New Service rifle, developed by Albert Statham in the early 1930s, was also notable, while the underlever Mk 3 remained in production for nearly 30 years; its mantle has now fallen to the Hawk, Osprey and Vulcan.

Webley Hawk Mk 3

Introduced in April 1977 and discontinued in 1979, this was a fixed-barrel version of the interchangeable-barrel Hawks Mk 1 (1971) and 2 (1974). All guns have adjustable triggers, controlled by an Allen-head screw atop the breech plug, but the Mk 3 has a sliding trigger-locking safety catch on the rear left side rather than behind the receiver. The efficient double-ring piston seal made the consistently performing Hawk quite powerful, but its all-plastic sights proved troublesome; it has now been superseded by the Vulcan. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,040/40.7; *bl*, 435/17.1; *rf*, 12R; *wt*, 2.95/6.50; *ps*, 2 copper impregnated PTFE washers; *bs*, neoprene O-ring; *sft*, manual.

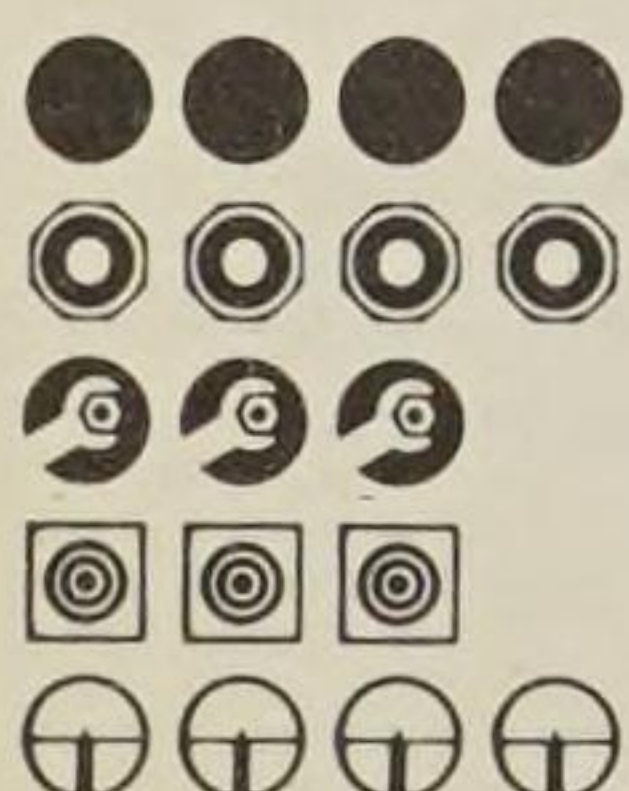
Obsolescent Webley & Scott airguns

Model	Falcon	Jaguar	Junior Mark 2	Mark 1	Mark 3	Mark 3 Supertarget	Premier Mark 2	Senior Mark 2
Class	R5	R5	P4	P3	R2	M3:R2	P3	P3
Calibre(s)	4.5/0.177 5.5/0.22	4.5/0.177	4.5/0.177	4.5/0.177 5.5/0.22	4.5/0.177 5.5/0.22	4.5/0.177	4.5/0.177 5.5/0.22	4.5/0.177 5.5/0.22
Length overall	1,054/41.11	927/36.15	203/7.92	215/8.39	1,105/43.10	1,105/43.10	211/8.23	215/8.39
barrel	440/17.16	362/14.12	152/5.93	167/6.51	470/18.33	470/18.33	167/6.51	167/6.51
Weight	2.72/6.0	1.70/3.75	0.66/1.46	0.85/1.87	3.09/6.81	3.57/7.87	0.88/1.94	0.93/2.05
Rifling	12R	7R	none	7R	7R, 12R	12R	12R	7R
Date	1960 – 70	1947 – 76	1973 – 77	1926 – 62	1947 – 75	1963 – 75	1974 – 77	1946 – 62



Webley Hurricane

Introduced early in 1977, the Hurricane retains the proven Johnstone-Fearn system of the Premier (see page 12), in which the barrel lies above the air cylinder – permitting a long barrel for short overall length, though the long back sight mount negates some of this advantage. The backward moving piston gives unique firearm-like recoil and spring-surge effects. The Hurricane has an adjustable trigger, a rotary safety catch on the left side of the frame above the grip, a hooded front sight, the standard fully adjustable trigger, open back sight and an optional telescope sight bracket. The result is a pistol among the very best of its type. *Type*, lifting-barrel spring-air pistol, positively locked; *cl*, P2/P3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 283/11.1; *bl*, 203/8.0; *rf*, 12R; *wt*, 1.10/2.43; *ps*, PTFE washer; *bs*, neoprene O-ring; *sft*, manual.



Webley Osprey

The Osprey – the first commercially available British sidelever – was developed in 1974 and marketed from June 1975. The double piston rings give a consistency of performance rarely matched by other guns in its class, and the sidelever has an elegant sliding catch which, again, is a feature absent from some competing designs. The Osprey shares the adjustable trigger system of the Hawk, but an automatic ratchet safety prevents the lever springing closed during the cocking stroke; this device is noisy, however. Ospreys have standard synthetic open tangent-leaf back sights and a tough plastic lever on the loading tap, which changed from tapered to parallel-sided in 1976. The elegant beech stock has a cheekpiece, a plain rubber butt-plate and an extremely slender fore-end, too shallow for some tastes. *Type*, fixed-barrel sidelever-cocking spring-air rifle, loaded through a rotary plug; *cl*, R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,100/43.3; *bl*, 470/18.5;



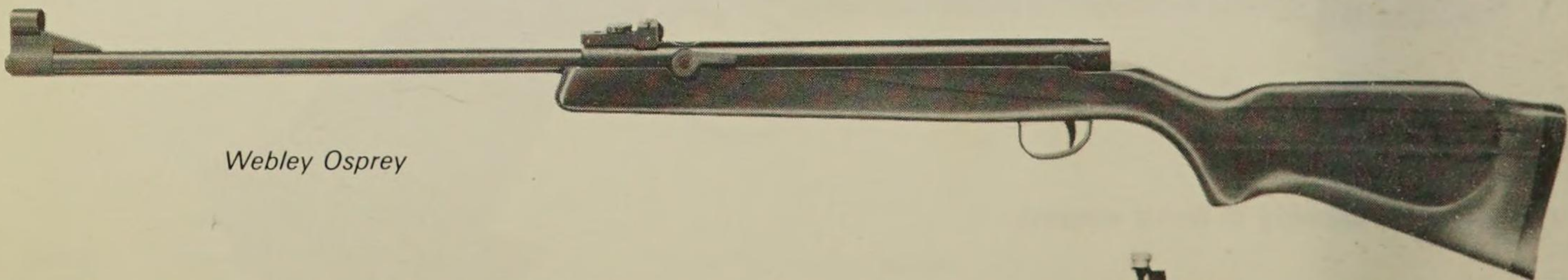
Webley Hurricane



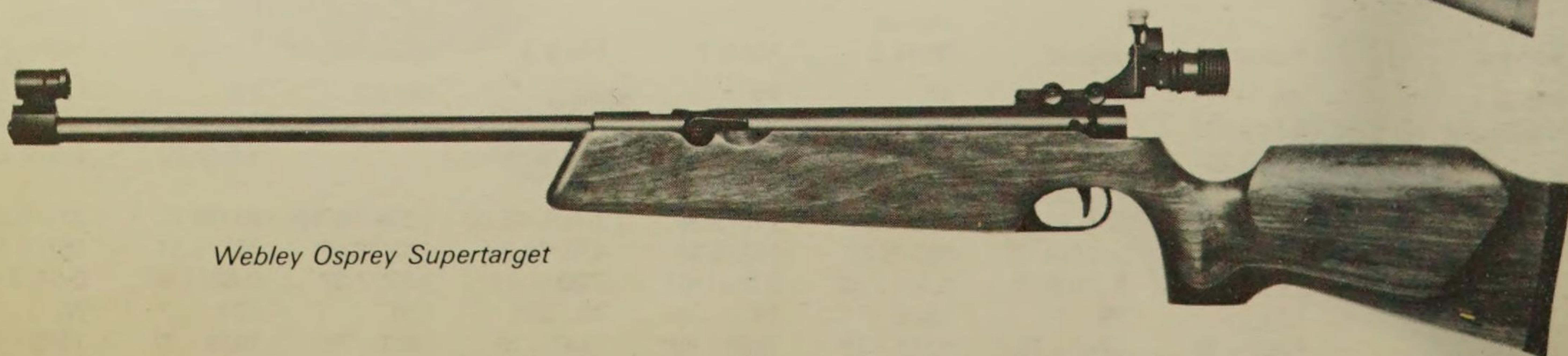
rf, 12R; *wt*, 3.50/7.72; *ps*, 2 copper impregnated PTFE washers; *sft*, automatic and manual.

Webley Osprey Supertarget

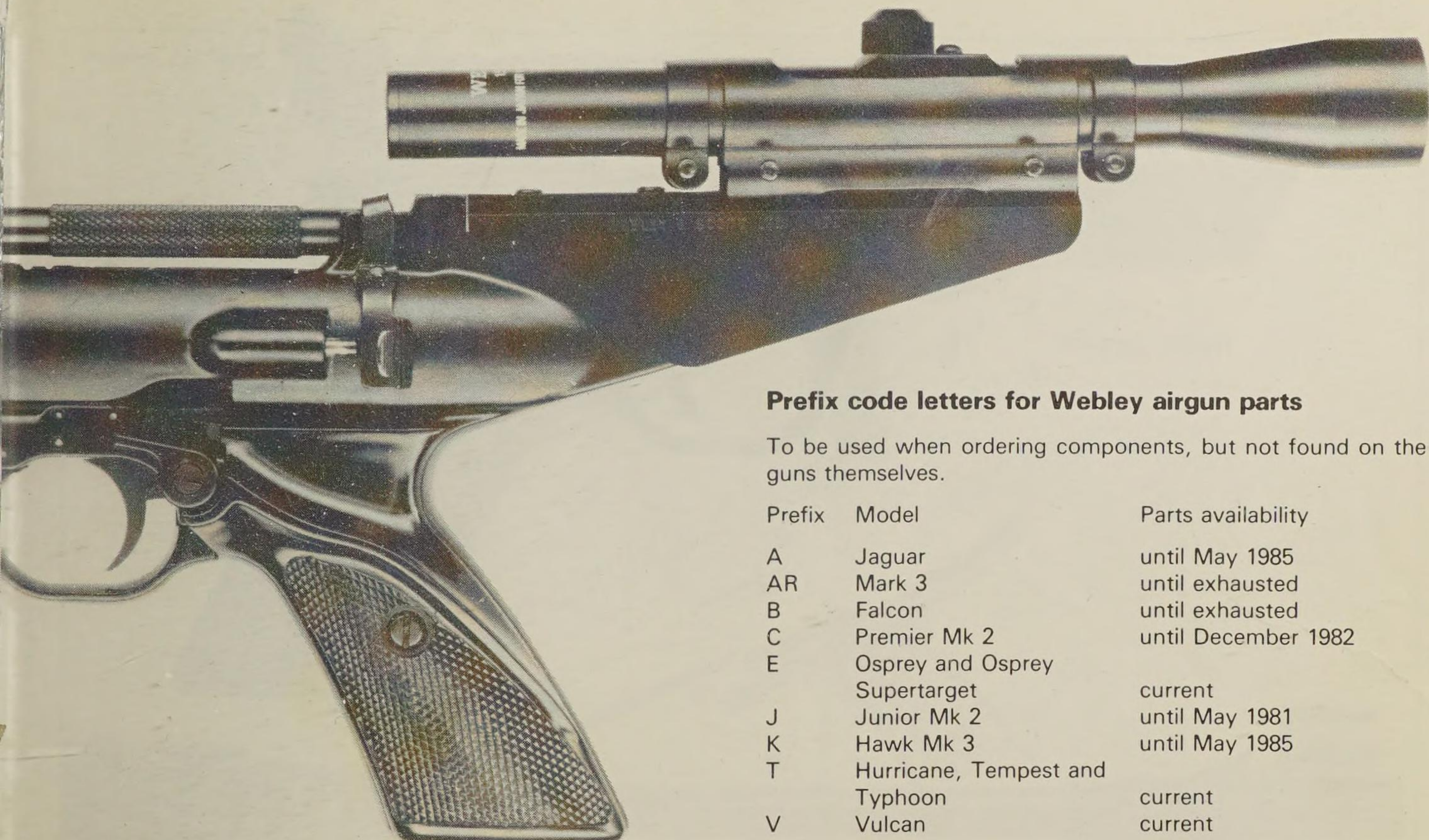
Though hardly a match for the leading recoilless designs, the Osprey Supertarget is nevertheless superior to many 'recoiling' types, owing to its sophisticated piston seal and special low-power mainspring which reduces muzzle velocity to about 550fs (165ms) with RWS Meisterkugeln. Cocking effort is about 35 per cent lower than normal. Its trigger is inferior to the Weihrauch Rekord pattern, but the European walnut competition-style stock, though lacking an adjustable butt-plate and pistol grip roughening, is undoubtedly an asset. An Anschütz replaceable-element front sight is mounted on a heavy squared muzzle block and an Anschütz 6723 aperture back sight on a curious longitudinally-slotted spacer plate carrying its mounting dovetail. *Type*, fixed-barrel sidelever-cocking spring-air rifle, loaded through a rotary plug; *cl*, M2; *cal*, 4.5/0.177; *loa*, 1,092/43.0; *bl*, 470/18.5; *rf*, 12R; *wt*, 4.11/9.06, 4.34/9.57 with sights, *ps*, 2 copper impregnated PTFE washers; *sft*, automatic and manual.



Webley Osprey



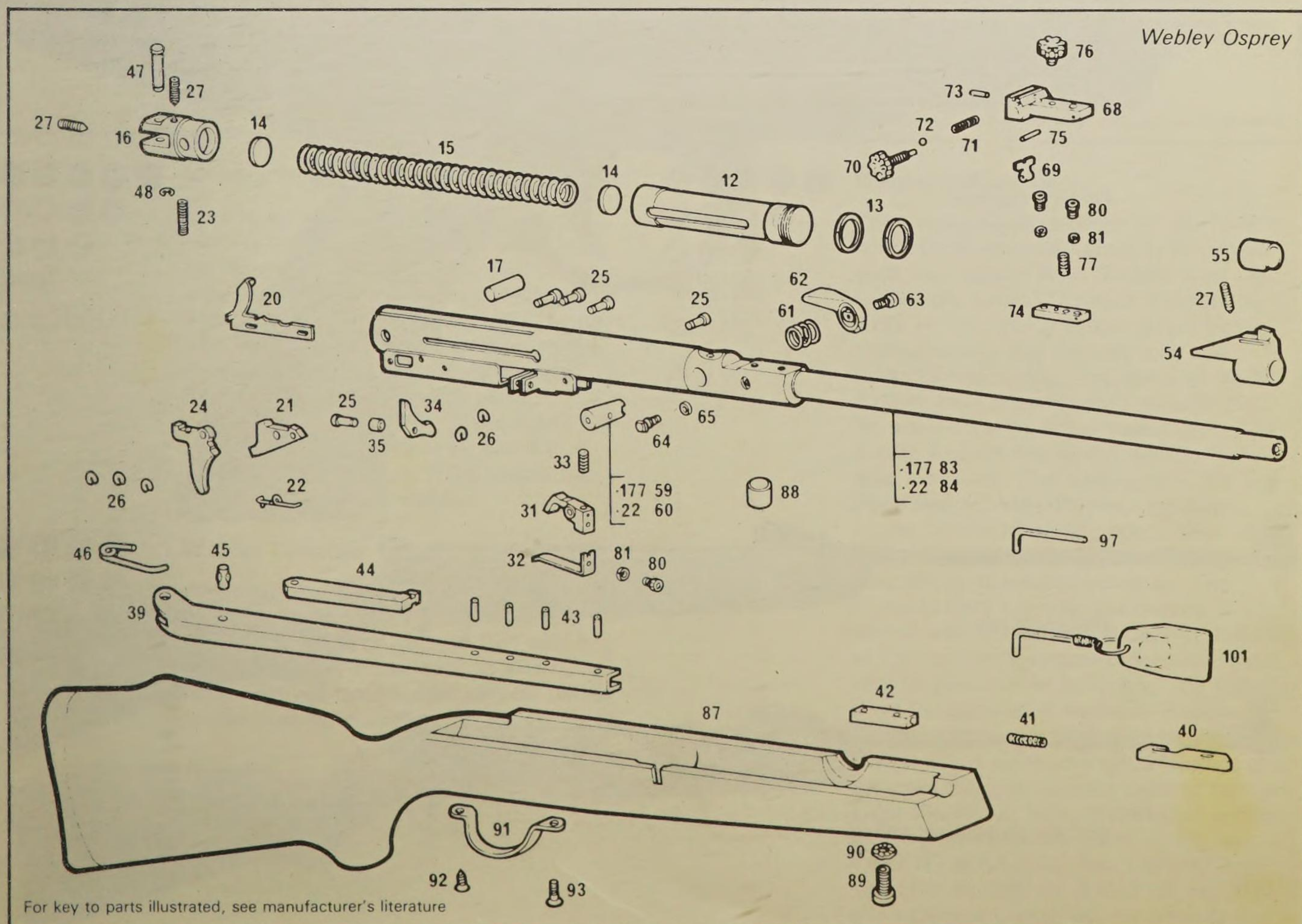
Webley Osprey Supertarget

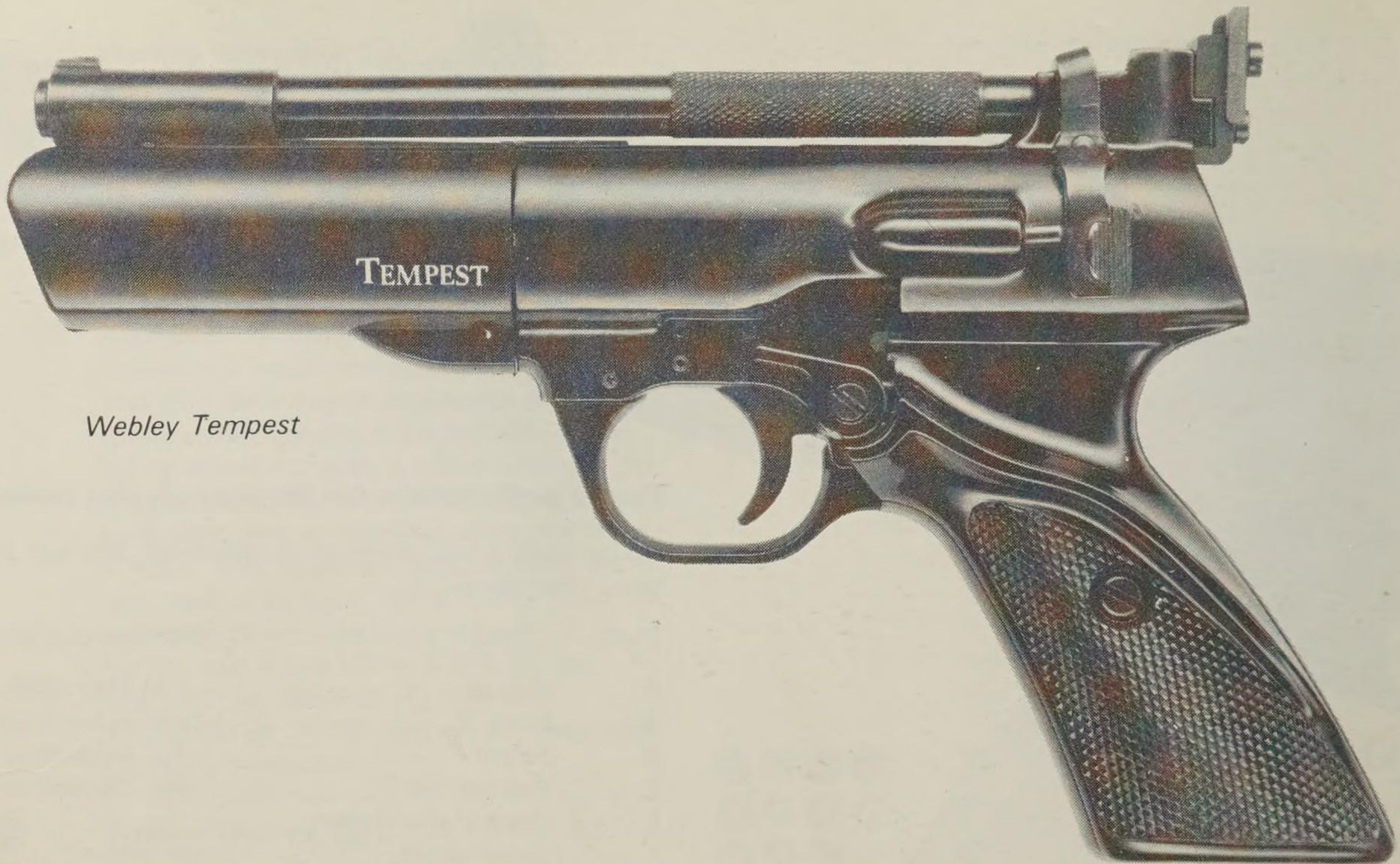


Prefix code letters for Webley airgun parts

To be used when ordering components, but not found on the guns themselves.

Prefix	Model	Parts availability
A	Jaguar	until May 1985
AR	Mark 3	until exhausted
B	Falcon	until exhausted
C	Premier Mk 2	until December 1982
E	Osprey and Osprey Supertarget	current
J	Junior Mk 2	until May 1981
K	Hawk Mk 3	until May 1985
T	Hurricane, Tempest and Typhoon	current
V	Vulcan	current

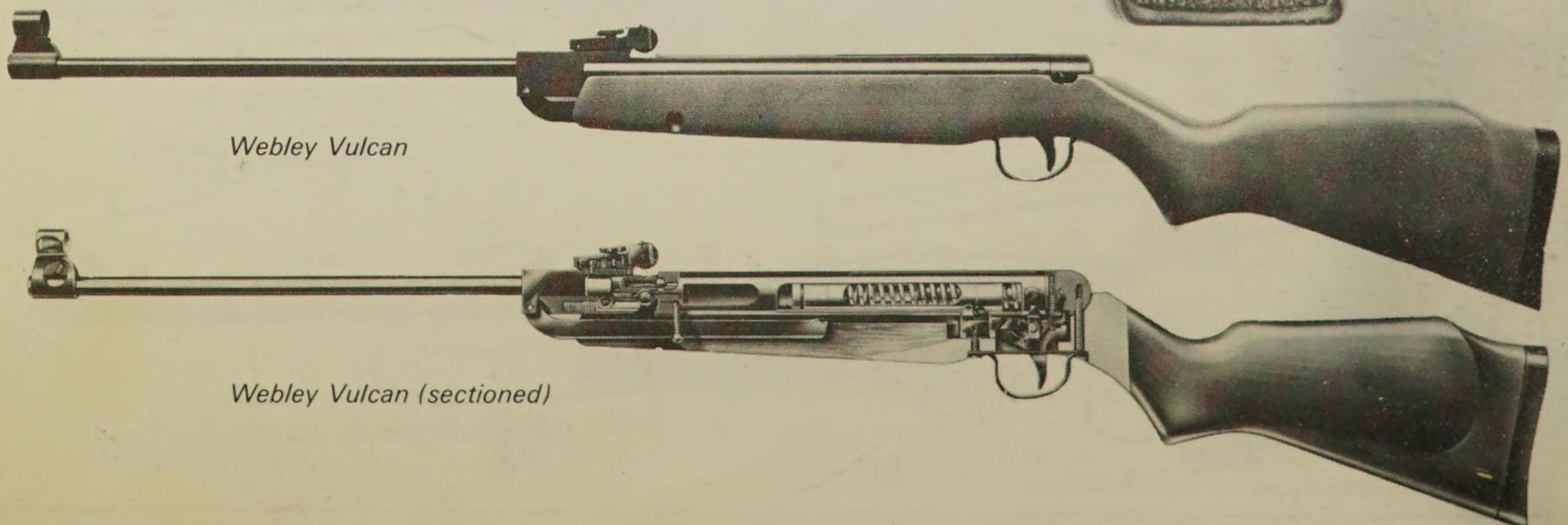




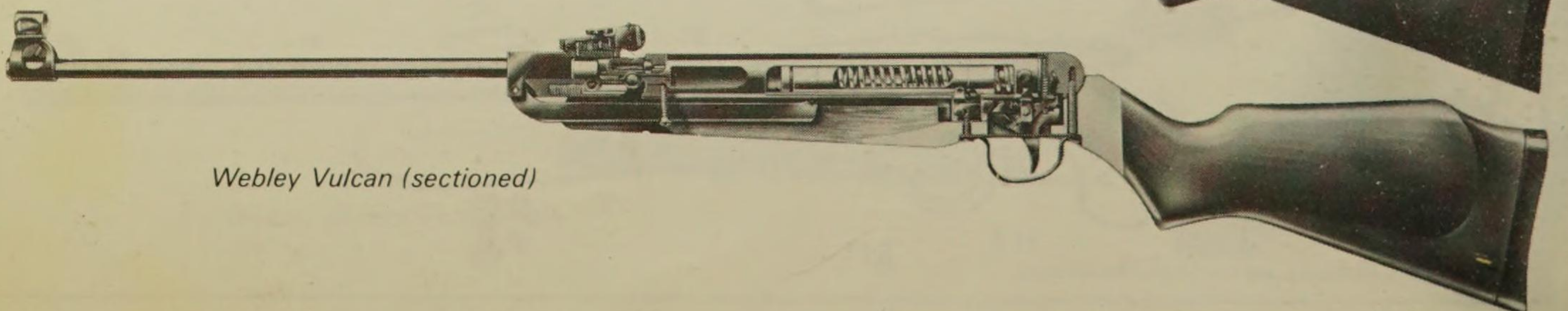
Webley Tempest



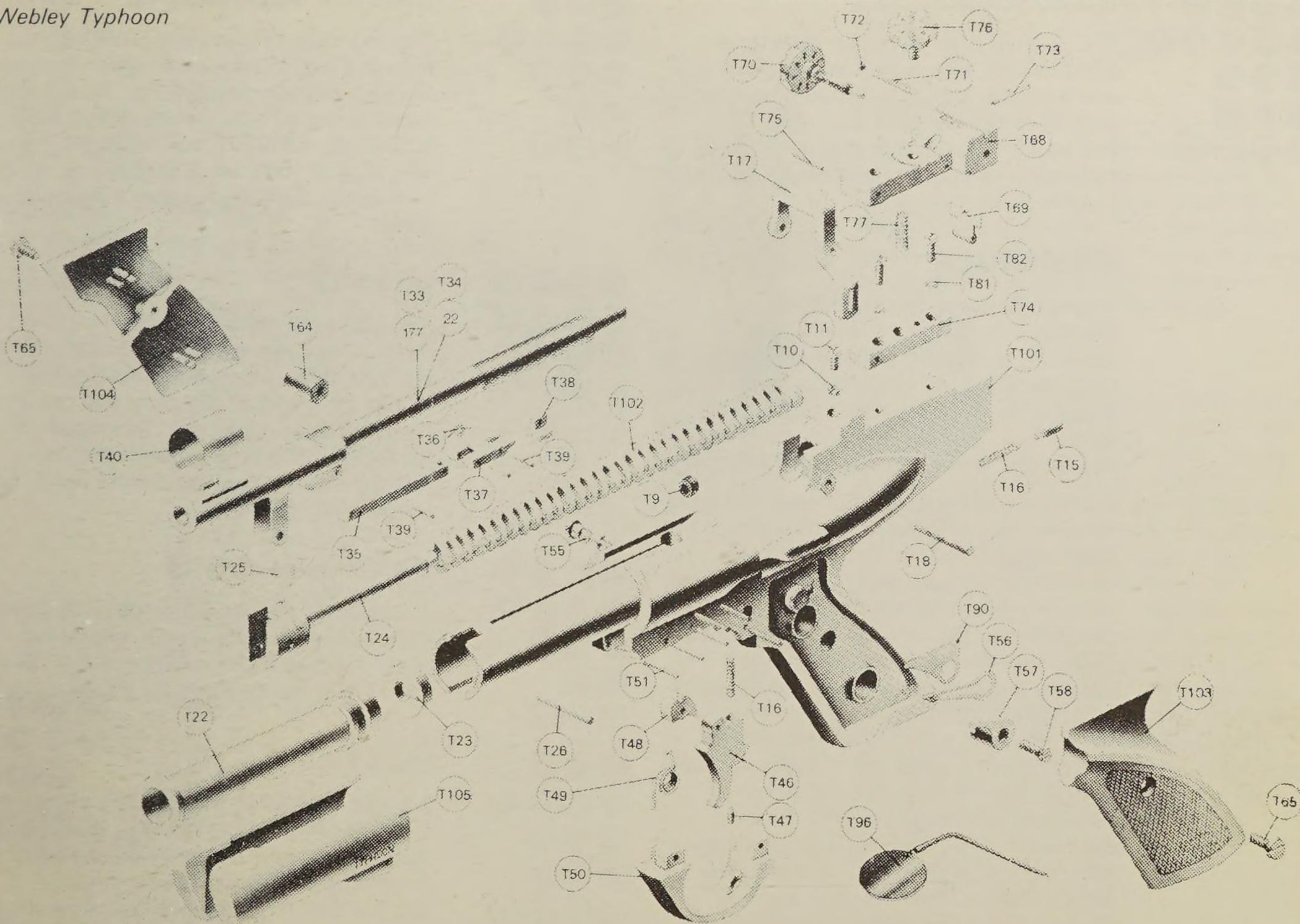
Webley Typhoon



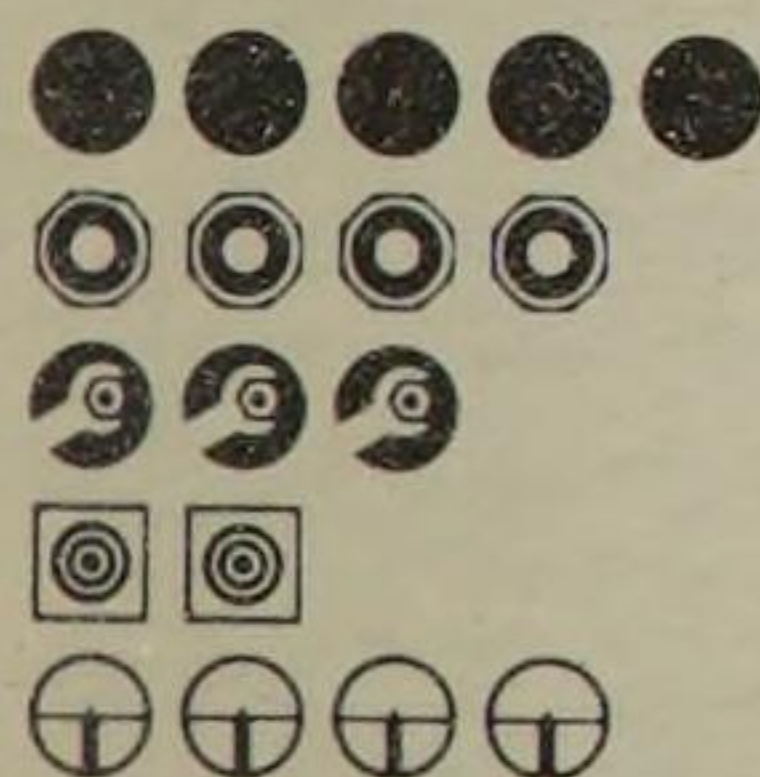
Webley Vulcan



Webley Vulcan (sectioned)

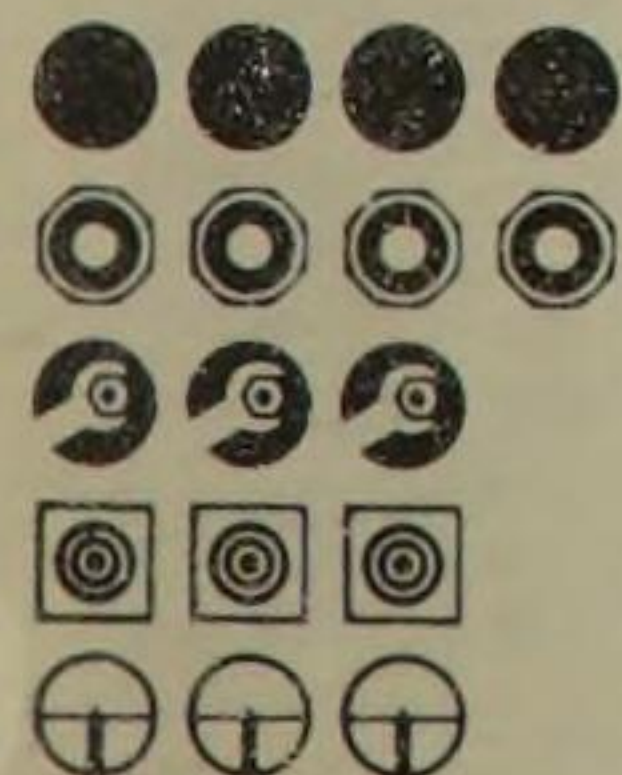


For key to parts illustrated, see manufacturer's literature



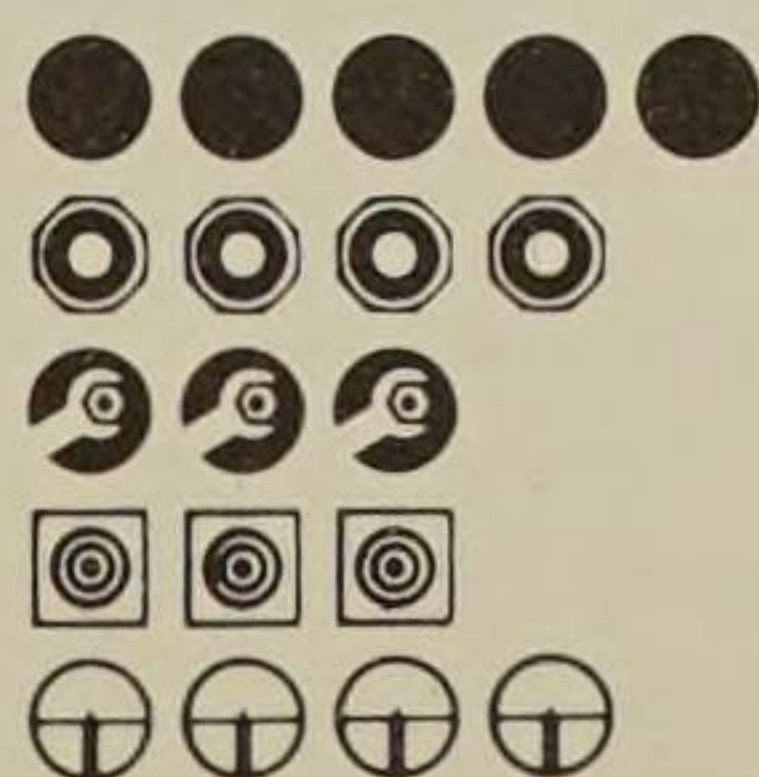
Webley Tempest

Introduced early in 1979, this compact pistol is every bit as powerful as the larger Hurricane. It has simpler open sights but is otherwise very similar, competitively priced and efficient though a little difficult to cock. The Tempest is a fitting successor to the Premier Mk 2, which is tribute enough. *Type*, lifting-barrel spring-air pistol, positively locked; *cl*, P3/P2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 232/9.1; *bl*, 175/6.9; *rf*, 12R; *wt*, 0.90/2.00; *ps*, PTFE washer; *bs*, neoprene O-ring; *sft*, manual.



Webley Typhoon

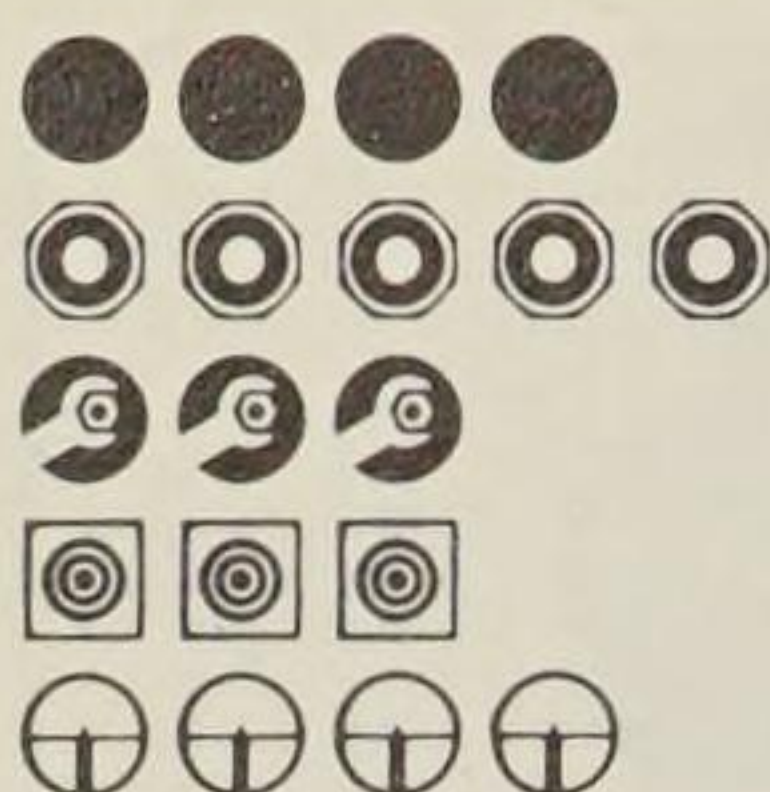
A low-power version of the Hurricane with a weaker mainspring, developing about 15 per cent less muzzle velocity (but with a commensurately lesser cocking effort). Its small grips are intended for juniors. Details generally as for Hurricane.



Webley Vulcan

The Vulcan made its début in July 1979. It is small, yet powerful; properly lubricated guns may exceed 800fs (245ms) with lightweight 4.5/0.177 pellets such as the RWS Hobby, owing to the unique piston sealing system and the very long and powerful mainspring. The sights of the Mk 3 Hawk have been retained, though the front sight is alloy rather than plastic. The breech seal still lies on the receiver rather than the barrel. The cocking lever is a one-piece design, while the new adjustable trigger (minimum setting about 3lb, 1.35kg) features constant sear engagement throughout its adjustment range. The manual safety catch on the receiver is shared with the Hawk and Osprey. The butt of the supremely elegant beechwood stock, with its plain rubber butt-plate, is a little too short for some adult shooters. However, like the comparable BSA Mercury Mk 3, the Vulcan offers some very good features and is more sophisticated than some of its more expensive rivals. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,037/40.8; *bl*, 432/17.0; *rf*, 12R; *wt*, 3.21/7.08; *ps*, PTFE and neoprene O-ring; *bs*, neoprene O-ring; *sft*, manual.

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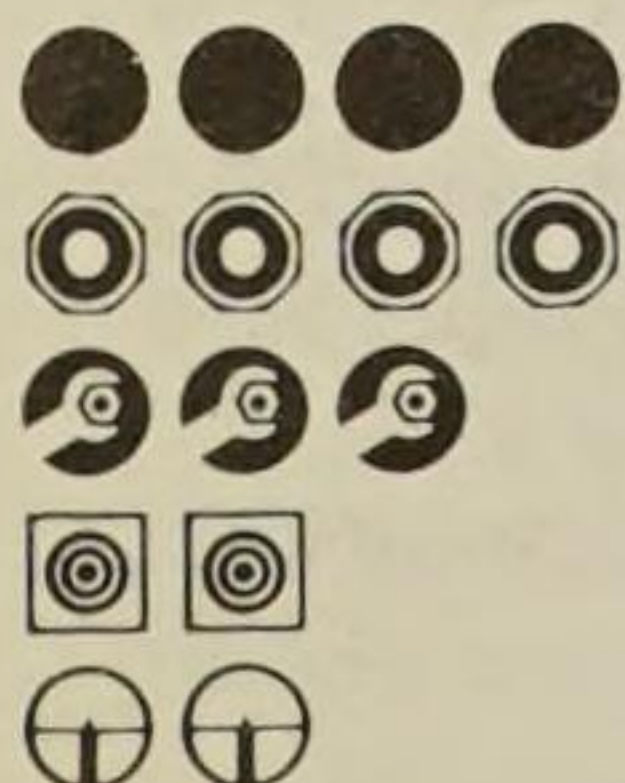
Webley Vulcan SE

The 'Special Export' Vulcan displays a walnut stock, chequering on the pistol grip and fore-end, and a ventilated rubber butt-plate accompanied by a thin white spacer. It is also fitted with a gold-plated trigger and safety catch. Details generally as Vulcan.

WEIHRAUCH

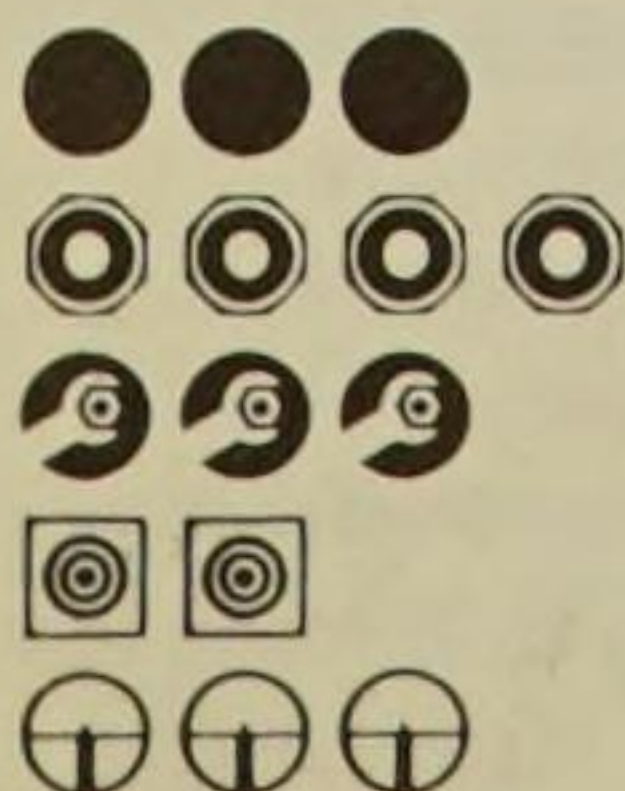
Hermann Weihrauch KG, D-8744 Mellrichstadt/Bayern, Germany. UK distributors: (factory appointed) Hull Cartridge Co. Ltd.; (importer of guns from Albrecht Kind) Norman May & Co.; US distributors: Beeman Precision Air Guns and others; Standard warranty: 12 months.

Currently employing 220 men and owned by Hans-Hermann Weihrauch, this company began trading in Zella St Blasii in 1899, where sporting guns and 'Thüringen' brand bicycles were made throughout the pre-1939 era. The beginning of the Second World War pre-empted plans to make airguns, but operations were re-established in Bavaria in 1948. Production of bicycle parts recommenced immediately and the first HW35 rifles followed in 1950; smallbore rifles appeared from 1952 and Arminius handguns were added in 1960/61. Weihrauch now makes a range of airguns from the HW25 junior rifle to the HW55 Match pattern. They are generally well finished and many display beautifully figured hand-chequered walnut stocks, viewed with justifiable pride.



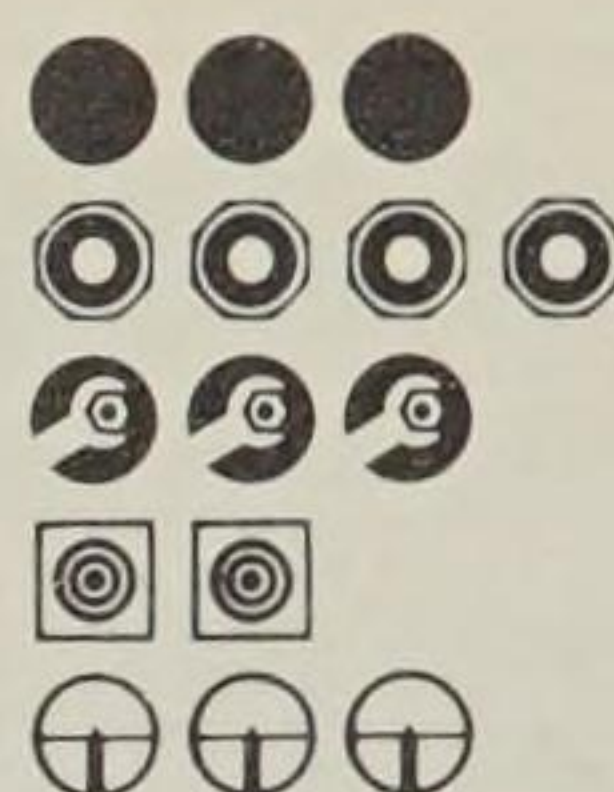
HW25

This is the cheapest rifle in the range, though still comparatively expensive. The HW25 displays very good quality and has a crisp non-adjustable two-stage trigger. Older guns had a spring-leaf back sight adjustable only for elevation, but the newer type is fully adjustable. The short butt is suitable for juniors. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R4; *cal*, 4.5/0.177; *loa*, 950/37.4; *bl*, 380/15.0; *rf*, 12R; *wt*, 1.90/4.19; *ps*, leather washer; *bs*, leather or rubber O-ring; *sft*, none.



HW30 M/II

This sturdy and well made rifle – albeit more expensive than some of its Spanish and other rivals – has the crisp Perfekt three-stage trigger system, which gives a smooth pull-weight of about 2kg (4.4lb). There is provision for a telescope or aperture sight. The standard front sight is a hooded blade, and the back sight (new guns) is a micro-adjustable spring-leaf type. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R3; *cal*, 4.5/0.177; *loa*, 1,020/40.2; *bl*, 430/16.9; *rf*, 12R; *wt*, 2.50/5.51; *ps*, leather washer; *bs*, leather or rubber O-ring; *sft*, none.



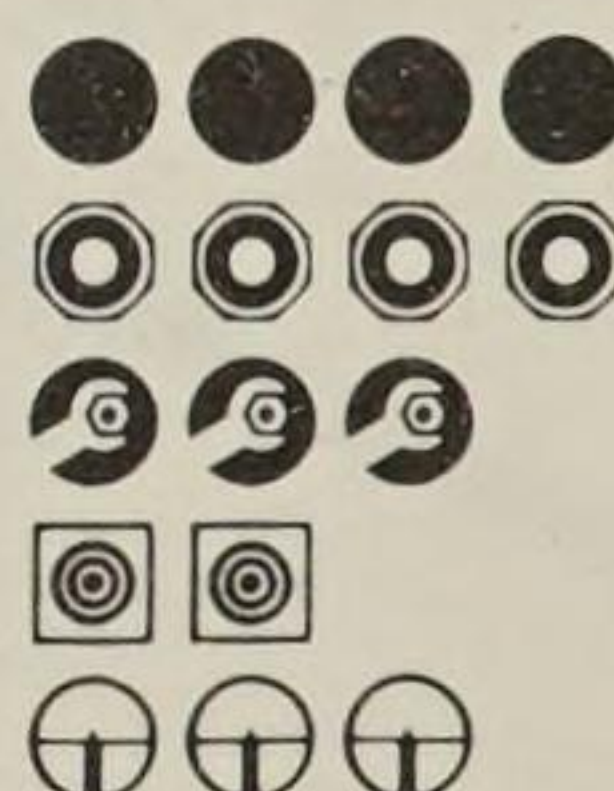
HW30 M/II Monte Carlo

This is simply the standard HW30 with a high or Monte Carlo comb, which supports the cheek better during firing. *Type*, break-barrel spring-air rifle, detent-locked (ball); *cl*, R3; *cal*, 4.5/0.177; *loa*, 1,020/40.2; *bl*, 430/16.9; *rf*, 12R; *wt*, 2.52/5.56; *ps*, leather washer; *bs*, leather or rubber O-ring; *sft*, none.



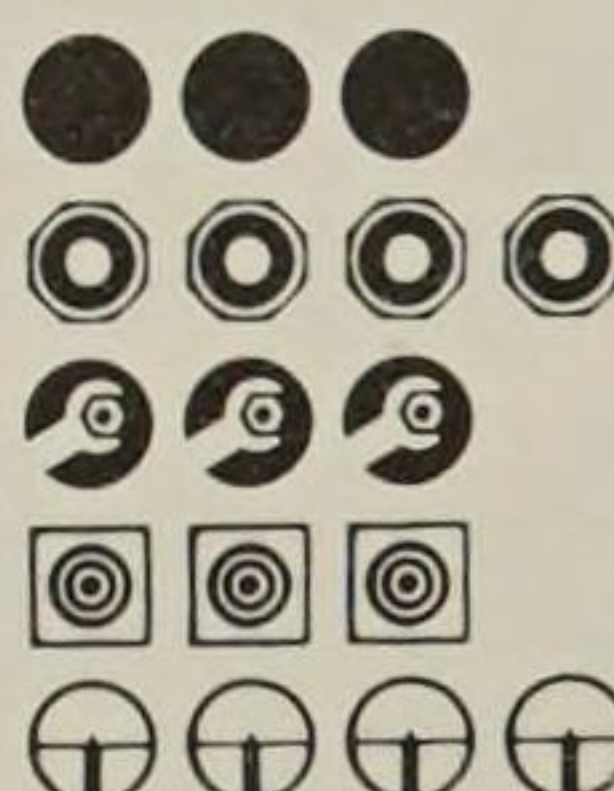
HW30S

This improved HW30 features the multi-lever Rekord trigger unit associated with the HW35 and 55, which is an outstanding feature for a gun of this class and more than repays its extra cost. The trigger of the HW30S, however, is set rather far forward for the firer with a small hand. See HW30 M/II for details.



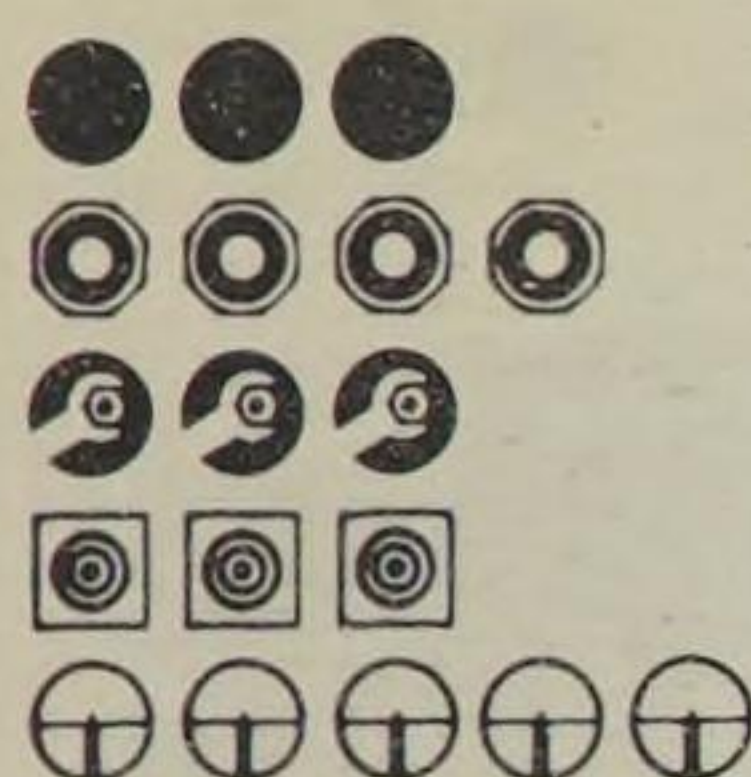
HW30S Monte Carlo

A version of the basic S-model with either a high, or Monte Carlo, comb, improving cheek support and shooting comfort. See HW30 M/II Monte Carlo for details.



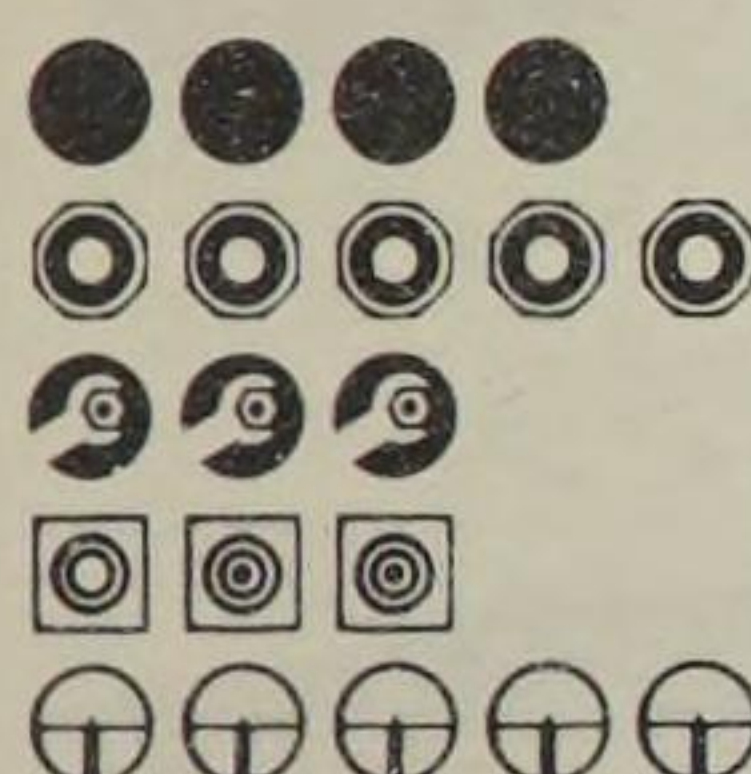
HW35

Introduced in 1950, the HW35 is among the most powerful spring-air rifles. However its extremely powerful mainspring gives a commensurately stiff cocking stroke; cocking the HW35 requires almost twice as much energy as the Feinwerkbau Sport and appreciably more than the Anschütz 335, which develop similar power. However, the HW35 balances very well, displays good workmanship and has the excellent Rekord trigger. Rifles made after late 1977 or early 1978 have a semi-automatic crossbolt safety on the left rear of the receiver which, applied automatically as the gun is cocked, must be reset before each shot. The front sight is an interchangeable-element tunnel pattern, while the spring-leaf back sight is fully adjustable, though aperture or telescope sights may be fitted instead. The thumb-operated 'hook' lever barrel lock, on the left side of the barrel block, is pulled forward to release the lock-bolt; compared to the clutch-lever types, it is a little inconvenient. The standard stock – plain walnut finished beech – has a pistol grip but no cheekpiece, and the rubber butt-plate is accompanied by a black plastic spacer. Many guns developing less than 7.5J have been sold in Britain as 'full power'. Rumours that these are Belgian-made or Weihrauch's rejects are unjustified, as most were simply destined for the German market. *Type*, break-barrel spring-air rifle, with a positive lock; *cl*, R2/R1; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,150/45.3; *bl*, 500/19.7; *rf*, 12R; *wt*, 3.76/8.29; *ps*, leather washer; *bs*, leather or synthetic O-ring; *sft*, semi-automatic on post-1977 guns only.



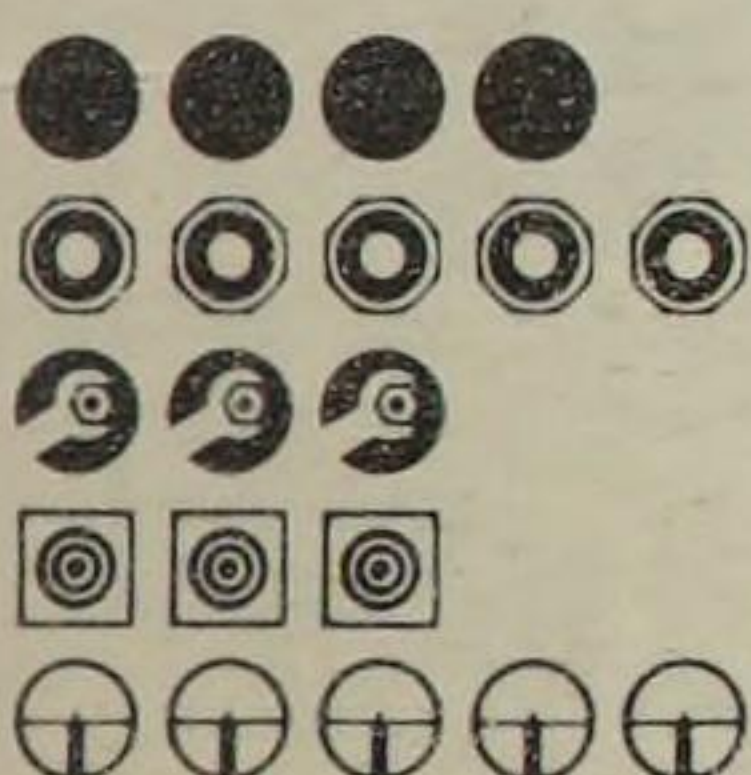
HW35B

This is a cheaper version of the HW35L, stocked similarly in beech rather than walnut. See HW35L for details.



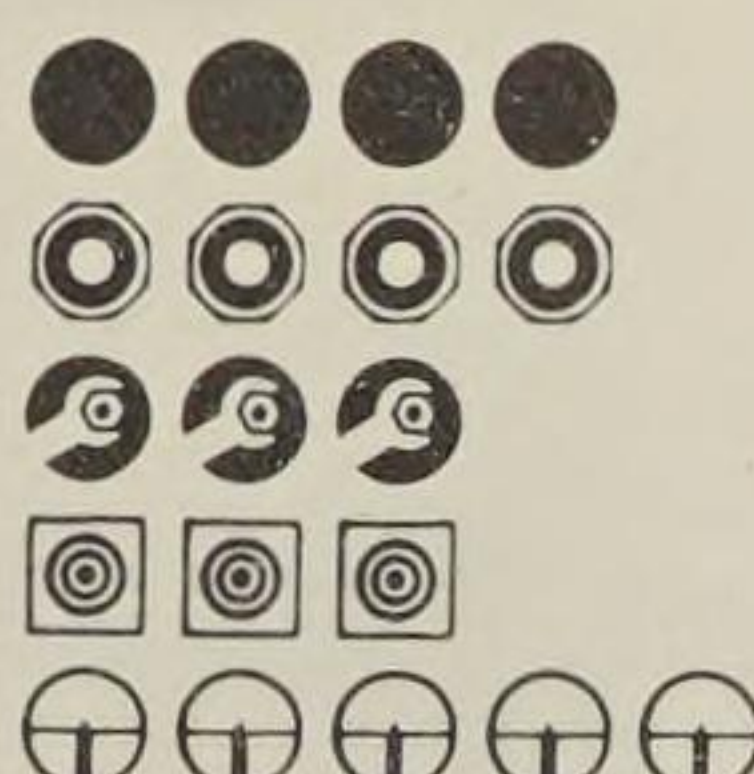
HW35E

The long-barrelled export pattern (Exportausführung) always displays a low comb American-style butt, a hand-chequered pistol grip, a grasping groove in the fore-end, ivory-coloured spacers between the rubber butt-plate and the separate pistol-grip cap, and sling swivels. The longer barrel gives improved leverage and the HW35E is a little easier to cock than the standard gun. Left-hand stocks may be obtained. *Type*, break-barrel spring-air rifle, with a positive lock; *cl*, R2/R1; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,210/47.6; *bl*, 560/22.0; *rf*, 12R; *wt*, 3.92/8.64; *ps*, leather washer; *bs*, leather or synthetic O-ring; *sft*, semi-automatic on post-1977 guns only.



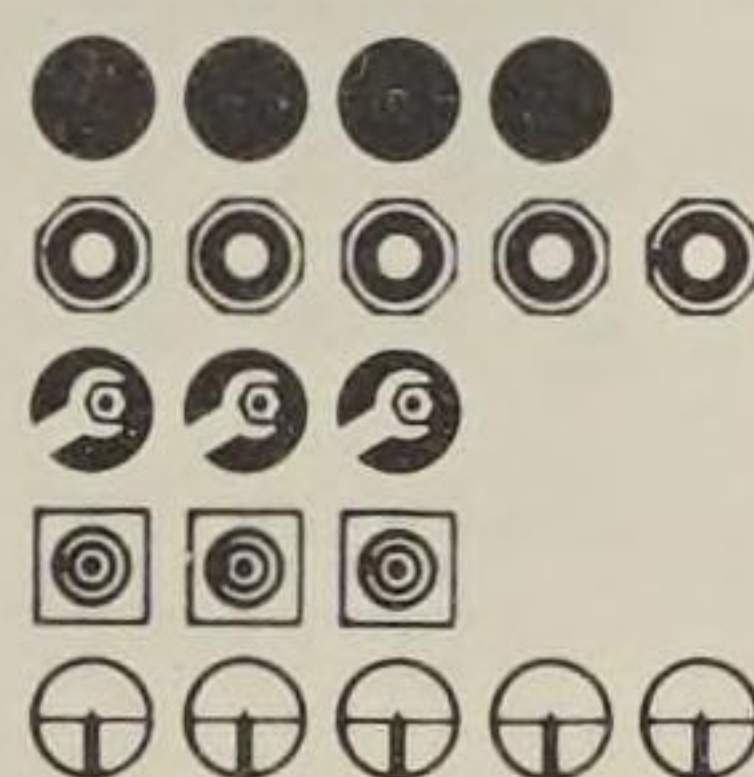
HW35EB

This version of the HW35 was developed for Beeman's Precision Airguns. Usually stocked in walnut, it has a lower comb, a grasping groove in the fore-end, ivory-



HW35 LS (or TS)

This rifle has an unusual thumbhole stock (Lochschaft) and a deep fore-end with an oblique cut tip, though it is mechanically identical with the HW35. The stock design permits a steadier hold and improved trigger usage, but the wood is rather thin above the stock hole. See HW35 for details.



HW35L

The deluxe (Luxusausführung) HW35 has a specially finished walnut left- or right-hand stock – often displaying beautiful figuring – with hand-cut pistol grip chequering, a well shaped cheekpiece, a high or Monte Carlo comb and a rubber butt-plate. Sling swivels lie under the barrel and on the underside of the butt. The HW35L is expensive, owing to use of selected stock blanks and hand finishing, but its existence is justified by the excellent quality. *Type*, break-barrel spring-air rifle, with a positive lock; *cl*, R2/R1; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,150/45.3; *bl*, 500/19.7; *rf*, 12R; *wt*, 3.80/8.38; *ps*, leather washer; *bs*, leather or synthetic O-ring; *sft*, semi-automatic on post-1977 guns only.

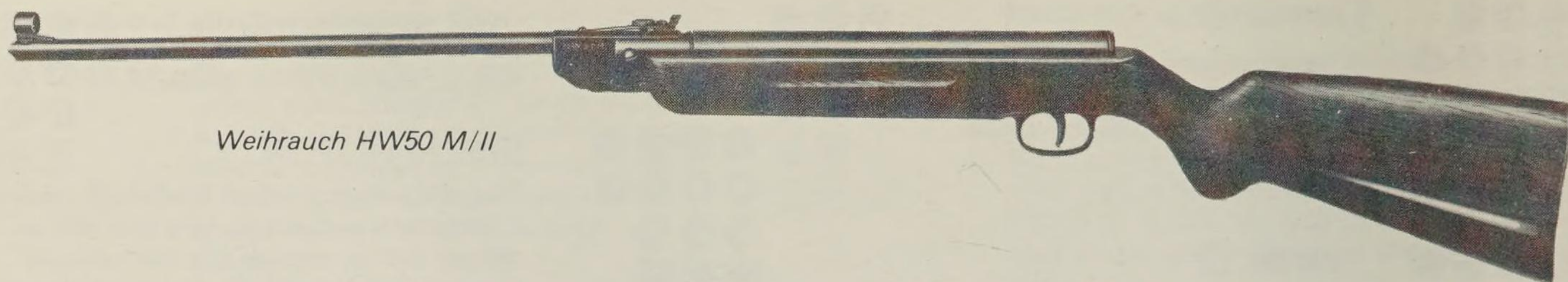


Weihrauch HW30 M/II

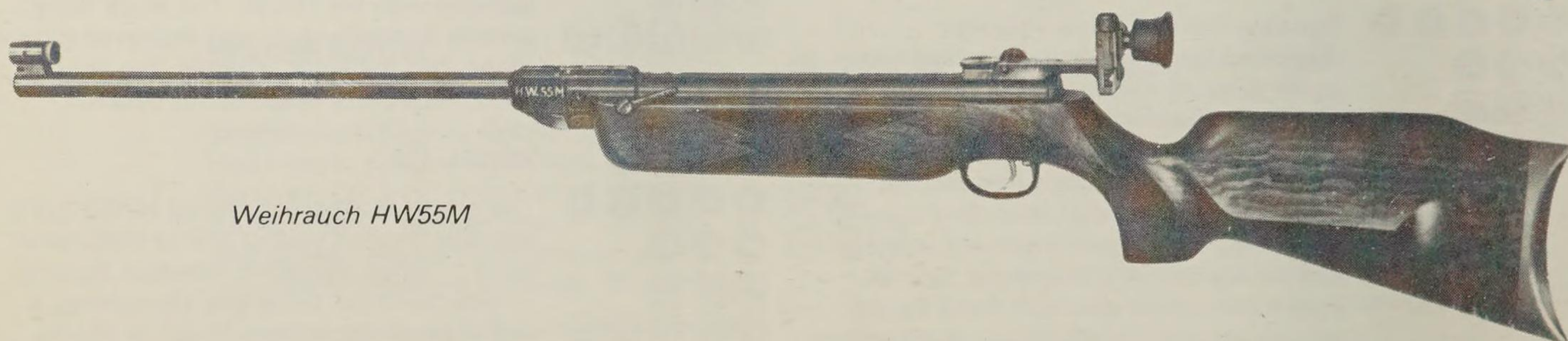
Weihrauch HW35

Weihrauch HW35E

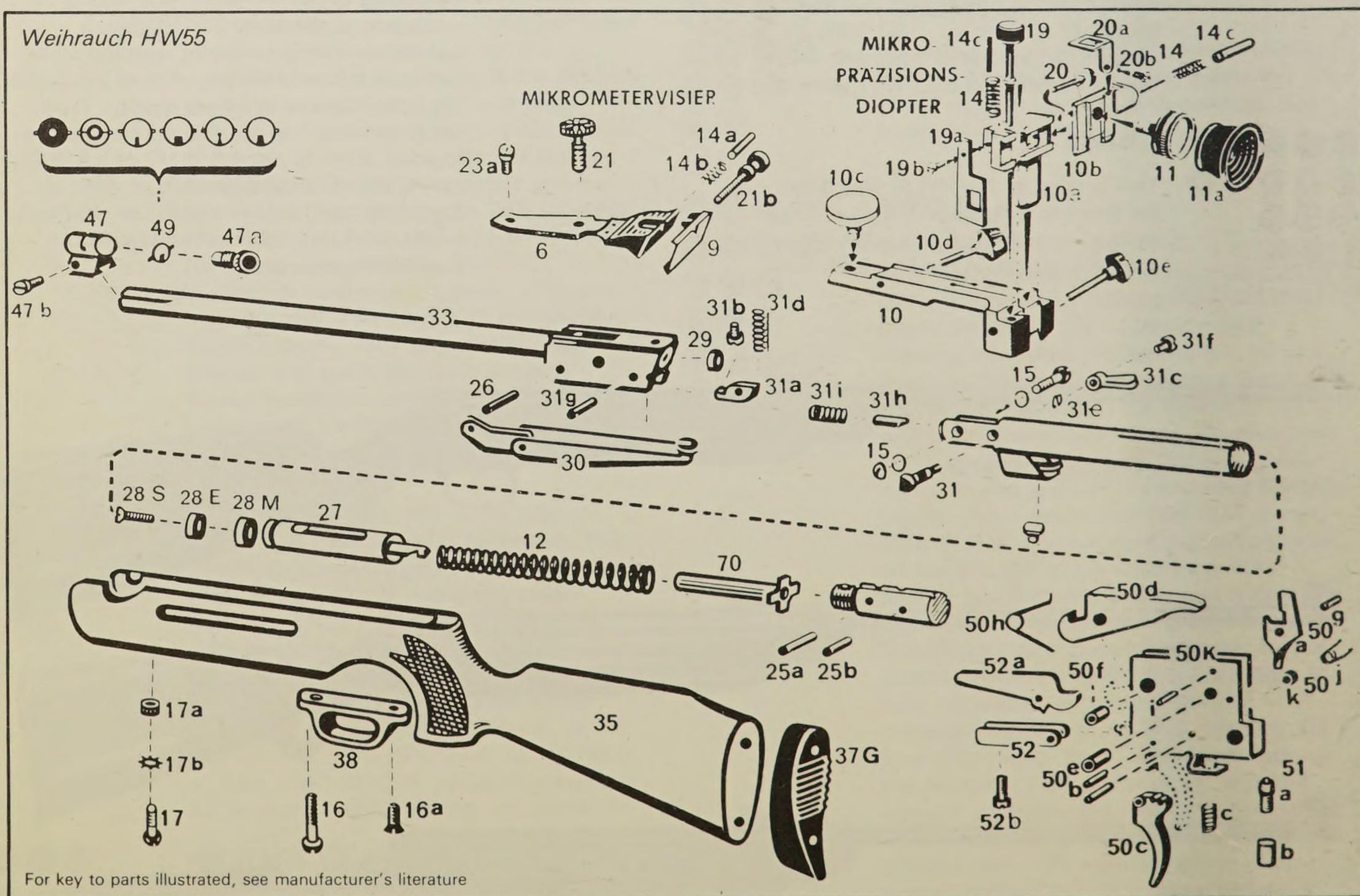
Weihrauch HW35L



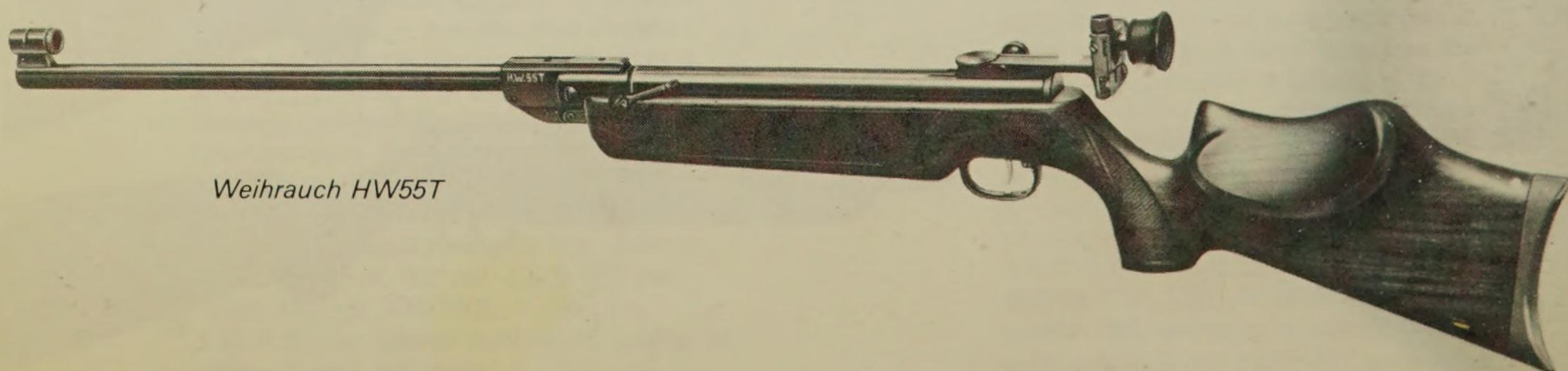
Weihrauch HW50 M/II

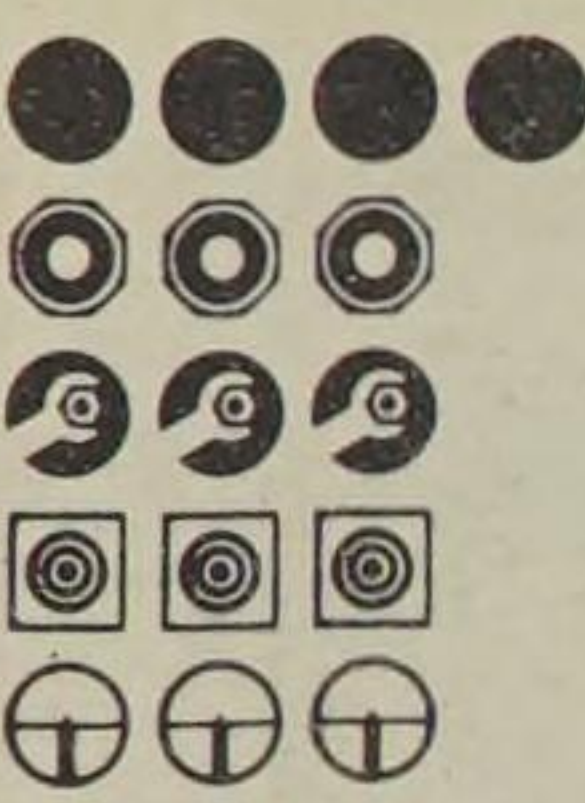


Weihrauch HW55M



Weihrauch HW55T





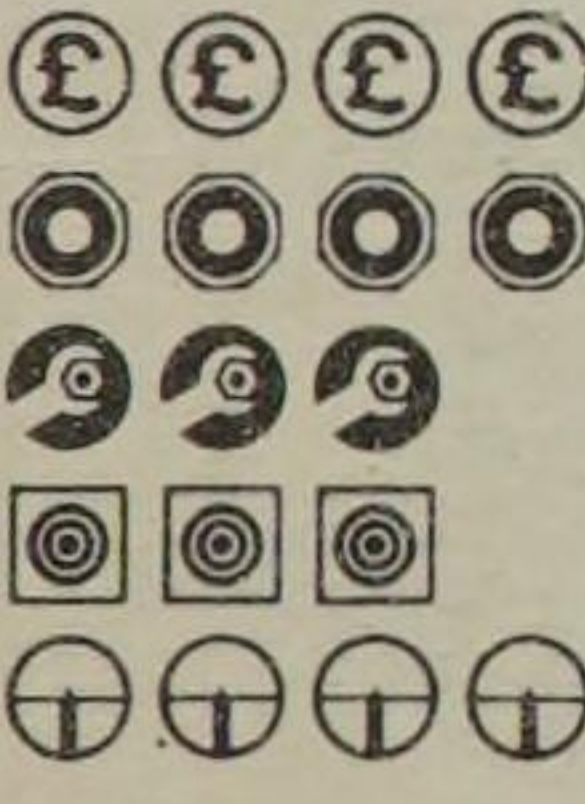
HW50 M/II

This good quality rifle is a larger 'intermediate' version of the HW30 M/II, sharing the Perfekt trigger system. It develops about 85–90 per cent of the power of the HW35, though the cocking stroke only requires about 65 per cent of the force. The plain beech stock has a pistol grip, but no cheekpiece, and the Americanate low comb is slightly curved. The HW50, handy and well-balanced, has the same sights as the HW35. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2/R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,100/43.3; *bl*, 470/18.5; *rf*, 12R; *wt*, 3.07/6.77; *ps*, leather washer; *bs*, leather or synthetic O-ring; *sft*, none.



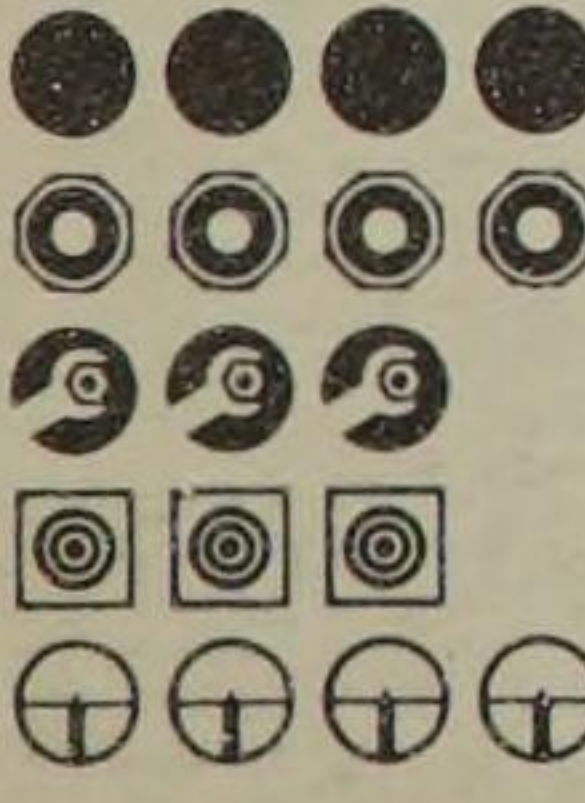
HW50 M/II Monte Carlo

This minor variant of the standard HW50 M/II has a pistol-gripped beechwood stock with a cheekpiece, a high Monte Carlo comb and a spacer-accompanied rubber butt plate. See HW50 M/II for details.



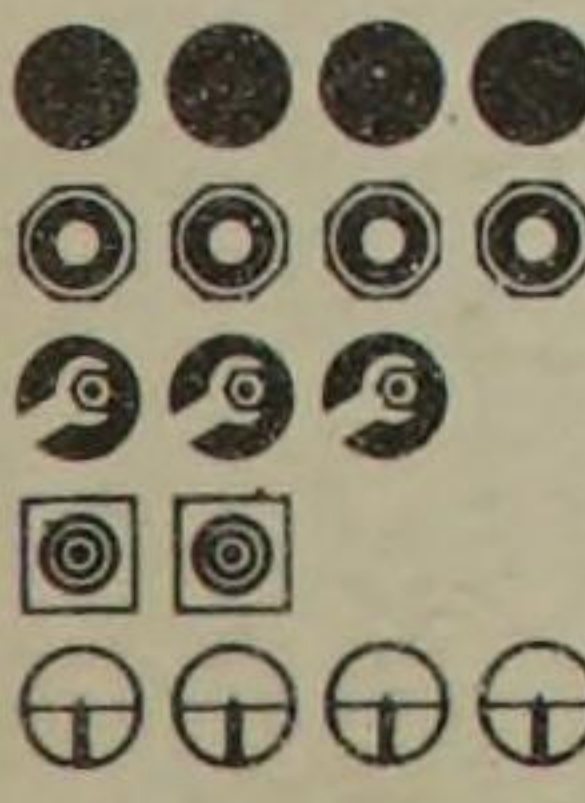
HW50S

The 50S is a good dual-purpose sporting/beginner's target rifle. It has the excellent Rekord trigger system, which is adequate compensation for the additional expense. The rifle is lighter and far easier to cock than the HW35. *Type*, break-barrel spring-air rifle, detent-locked (bolt); *cl*, R2/R3; *cal*, 4.5/0.177 or 5.5/0.22; *loa*, 1,100/43.3; *bl*, 470/18.5; *rf*, 12R; *wt*, 3.07/6.77; *ps*, leather washer; *bs*, leather or synthetic O-ring; *sft*, none.



HW50S Monte Carlo

This minor variation of the basic design is identical with the HW50S apart from its improved stock, which features a cheekpiece and a high or Monte Carlo comb. See HW50S for details.



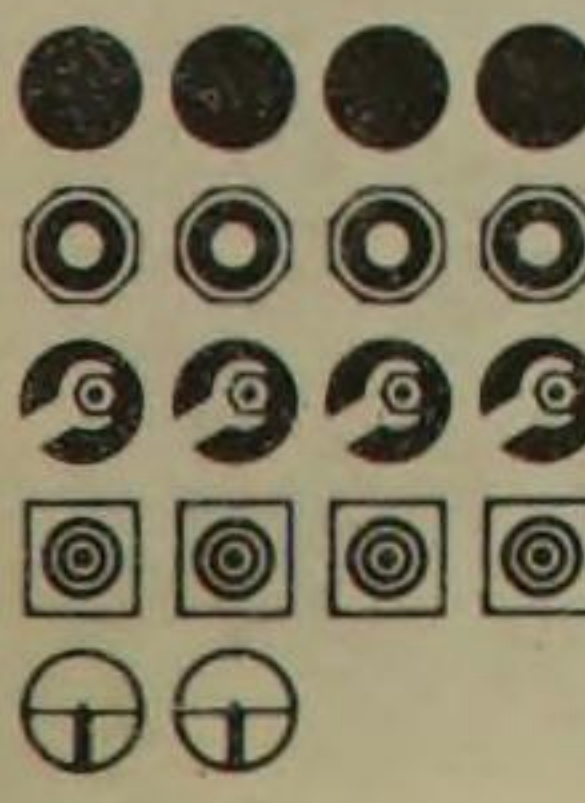
HW50SE

This derivative of the 50S, intended purely for sporting use, has a hooded ramp-mounted barleycorn front sight. See HW50S for details.



HW50SE Monte Carlo

The stock of this minor variant of the 50SE displays a high or Monte Carlo comb, and the rubber butt-plate is accompanied by a black plastic spacer. See HW50S for details.

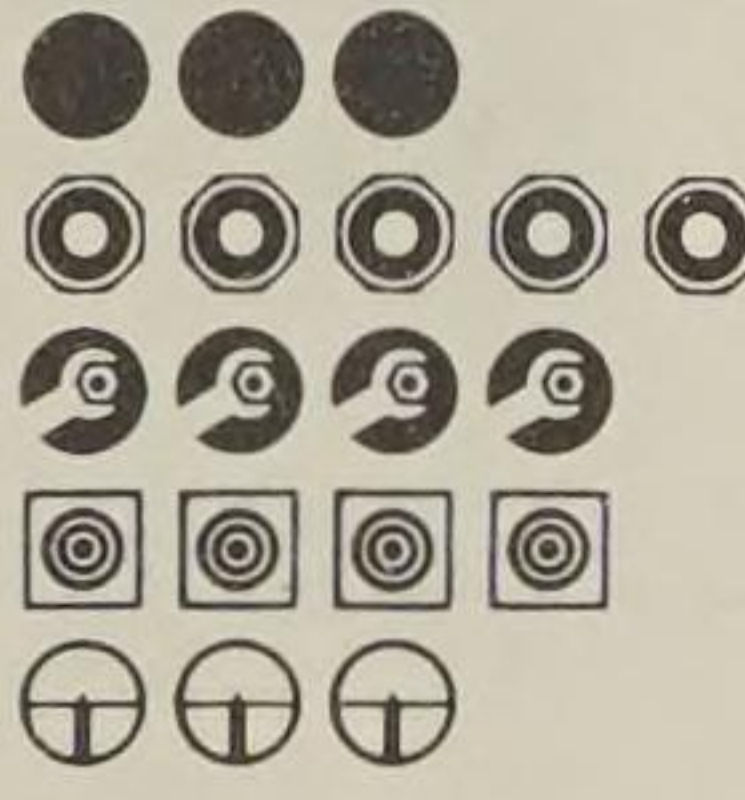


HW55M (or Match)

This HW55 has a fashionable, squared competition stock, which does not handle as comfortably as that of the 55T (banned, however, under many rules). Stippling may be found on the pistol grip, while the

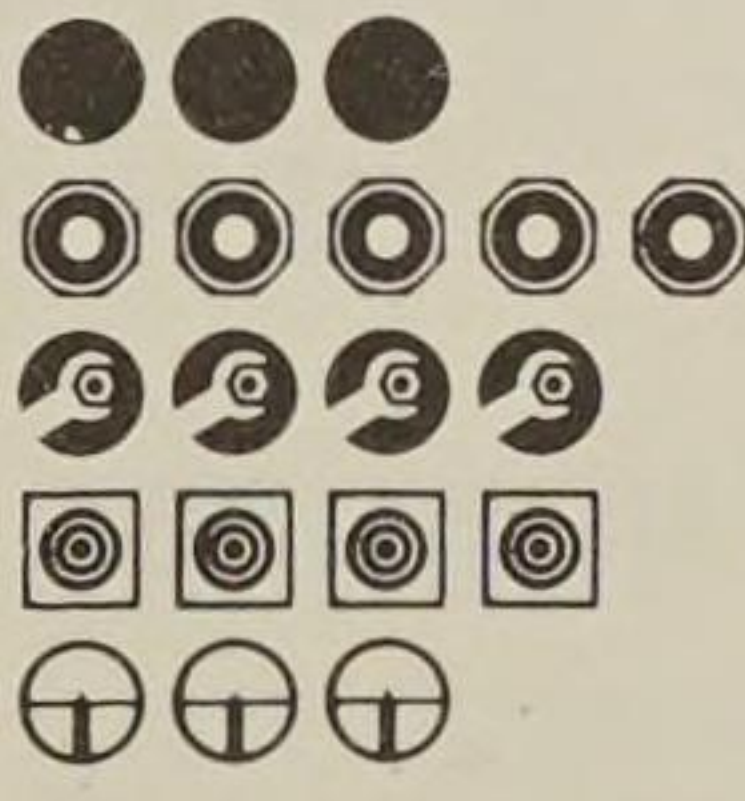
rubber butt-plate is adjustable. The extra gun weight – supplied by auxiliary barrel sleeves (400 and 900gm, 0.9–2lb) and an additional fore-end weight (400gm) – helps damp out recoil and spring-surge effects. Stocks may be walnut or beechwood.

Type, break-barrel spring-air rifle with a positive barrel lock; *cl*, M2; *cal*, 4.5/0.177; *loa*, 1,100/43.3; *bl*, 467/18.4; *rf*, 12R; *wt*, 4.00/8.82 without auxiliary weights; *ps*, leather washer; *bs*, leather ring; *sft*, none.



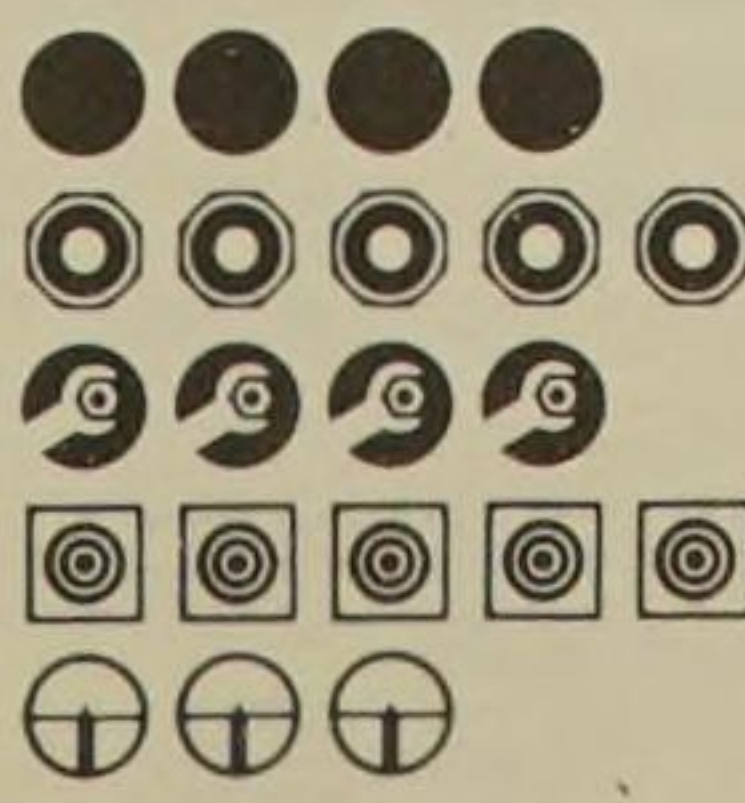
HW55MM

This minor variant of the 55SM has a specially selected walnut stock with hand-cut chequering on the fore-end and pistol grip. The cheekpiece on the low-comb butt is squared in Bavarian style and the butt-plate is rubber. *Type*, break-barrel spring-air rifle with a positive barrel lock; *cl*, M2/M3; *cal*, 4.5/0.177; *loa*, 1,100/43.3; *bl*, 467/18.4; *rf*, 12R; *wt*, 3.41/7.52; *ps*, leather washer; *bs*, leather ring; *sft*, none.



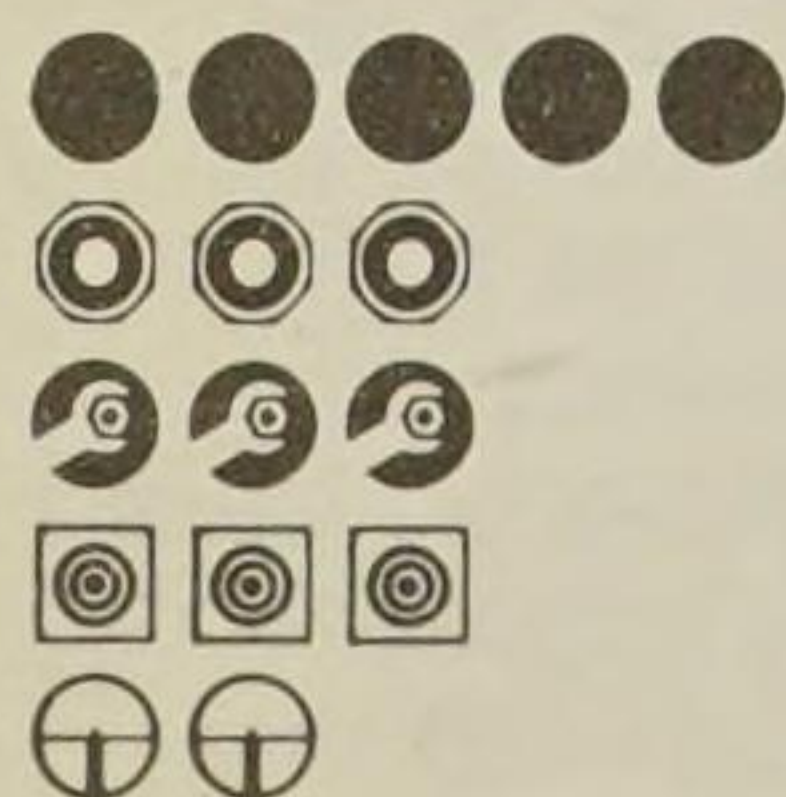
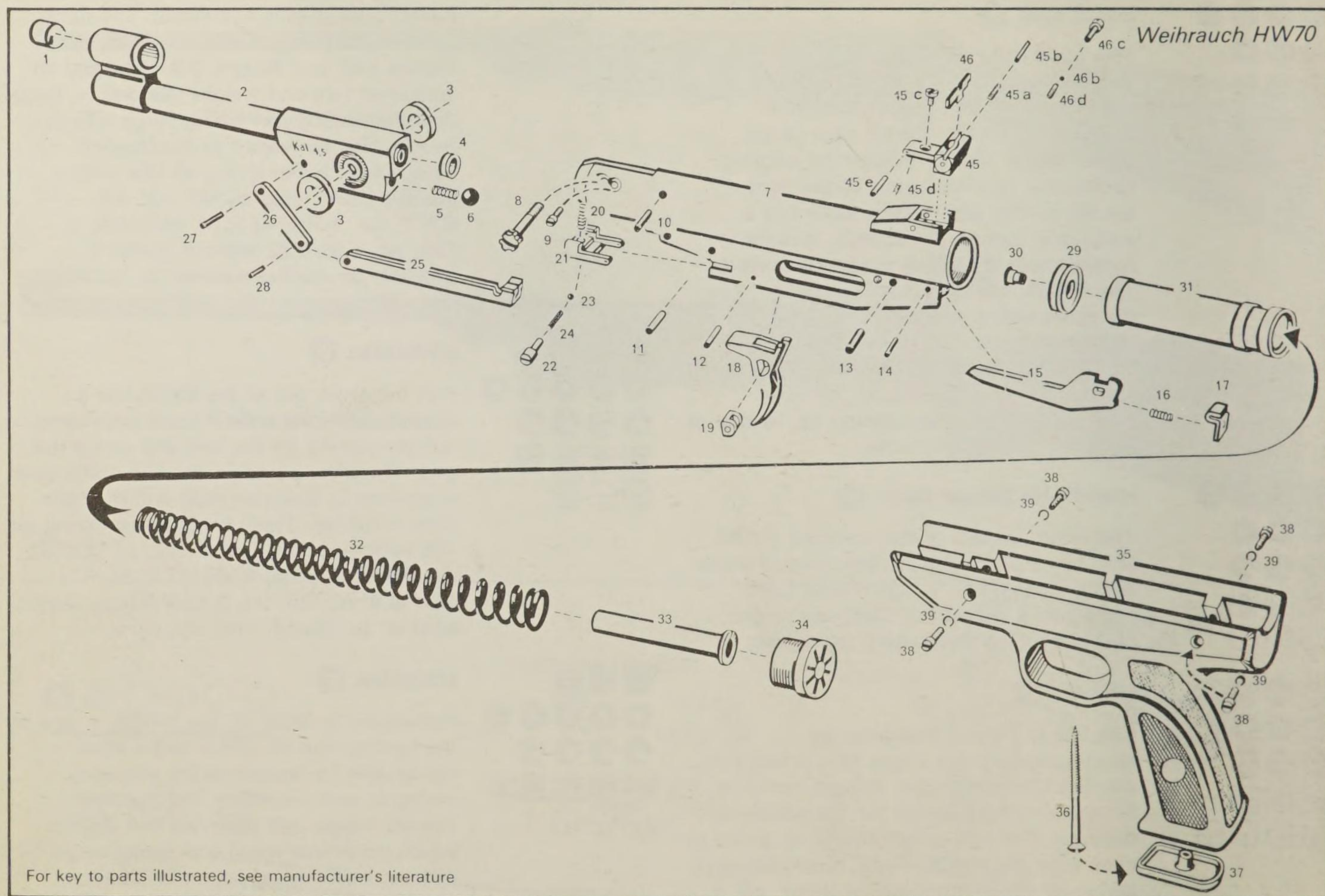
HW55SM

Introduced in 1955/56, the HW55 – one of the leading non-recoilless target rifles – has attained a reputation for accuracy, owing to well-cut rifling, the excellent Rekord trigger and relatively low power which minimizes recoil and spring-surge effects. However, the bore is usually of smaller than normal diameter and pellet-feeding troubles may arise if care is not taken. The radial lever barrel-lock on the left side of the breech behind the barrel block actuates a wedge, adjustable to counteract wear. Aperture sights are usually fitted, the back sight locking into any of three holes atop the breech, though the standard open sight may be fitted instead. The HW55SM has a plain beech pistol-grip stock, a grasping groove in the fore-end, but no cheekpiece. *Type*, break-barrel spring-air rifle with a positive barrel lock; *cl*, M2/M3; *cal*, 4.5/0.177; *loa*, 1,100/43.3; *bl*, 467/18.4; *rf*, 12R; *wt*, 3.39/7.47; *ps*, leather washer; *bs*, leather ring; *sft*, none.



HW55T

This shares the mechanical features of the 55SM, but displays the extraordinary concave cheekpiece and high comb of a Tyrolean stock (Tirolerschaft). The odd profile of the stock belies its unusual comfort, as it supports the cheek better than virtually any other design, and positions the eye unerringly behind the back sight. Regrettably, the craftsmanship involved inevitably makes these guns very expensive. *Type*, break-barrel spring-air rifle with a positive barrel lock; *cl*, M2; *cal*, 4.5/0.177; *loa*, 1,100/43.3; *bl*, 467/18.4; *rf*, 12R; *wt*, 3.46/7.63 or 3.76/8.28 with sights; *ps*, leather washer; *bs*, leather ring; *sft*, none.



HW70

This popular low-cost target pistol has a reasonably easy cocking stroke and low power, with minimal recoil and spring-surge. An automatic trigger-blocking safety prevents premature piston release. The trigger is an adjustable two-stage type and construction includes several heavy-duty precision castings; the barrel, for instance, is a rifled liner in a cast sleeve. The poorer features include inconvenient slotted-head screw sight adjustments and an uncomfortable 'slippery' plastic grip/frame unit. It has been alleged that occasional problems have arisen with the cylinder end-cap on pre-1977 guns. However, these claims have yet to be satisfactorily investigated. *Type*, break-barrel spring-air pistol, detent-locked (ball); *cl*, C3:P4; *cal*, 4.5/0.177; *loa*, 322/12.7; *bl*, 160/6.3; *rf*, 12R; *wt*, 1.09/2.40; *ps*, synthetic washer; *bs*, nylon O-ring; *sft*, automatic.

WHALEY

Whaley's of North London Ltd, 456 Hornsey Road, London N19 4EE, England. US distributor: none; Standard warranty: 12 months?

This company 'manufactures' rifles based on the Crosman 761XL, to the designs of Peter Marshall (see Marshall's Custom Airguns, page 81). The Whaley-Crosman is available in standard gold, matt black, polished aluminium, sandblasted black and sandblasted aluminium finish, and with mahogany, teak, oak, beech or walnut stocks.

YEW-HA

Tong-II Industry Co. Ltd., Nagkuron Building, Naguron-Dong Chongro-Ku., Seoul, South Korea (factory in Kyunggi). UK distributor: formerly Oliver J. Gower Ltd.; US distributor: now none; Standard warranty: unknown.

Little has been discovered about this company, only two of whose products have been distributed in Britain, Europe and the USA: the powerful 3B Dynamite air-shotgun, requiring as many as 125 (!) pump strokes to develop a velocity approaching 1,000fs, and a target rifle copied from the Feinwerkbau 300. The latter offers quite good value.

Ammunition

The **ball** projectile, made in a variety of calibres, remained pre-eminent until the advent of the Bolzenbüchsen (dart-firing guns) in the mid-nineteenth century, with their delicate individually sized and balanced darts. Similar darts accompanied the gallery guns popularized in the USA in the 1860s and 1870s, prior to the appearance of the first cheap BB guns, and improved darts were still being patented in the 1870s by Quackenbush (GB 3,448/75), Gifford (US 177,932) and others. However, ball ammunition was retained for magazine airguns, in which diabolo pellets were easily deformed.

Airguns **darts** were expensive, fragile and unsuitable for rifled bores, while balls were relatively inaccurate. Experiments with mallet-expanded balls, pillar breeches and stepped chambers had been undertaken with firearms in the middle of the nineteenth century with no effect on airgun design – but there was promise in the Minié-type self-expanding muzzle-loaded bullet, whose hollow base was expanded to engage the rifling by the force of the propelling gases. Henry Quackenbush patented the first hollow-base airgun **slug** in the mid-1870s (GB 765/76), but is unlikely to have originated the principle; Benjamin R. Banks' patent slug (GB 12,742/92) featured a short flared basal skirt – just one of many flared, ribbed or tapered types – while Frank Clarke's design (GB 23,432/03) had spiral flutes in its nose, intended to spin the slug in flight.

By 1914, only Nos. 1, 2 and 3 Bores (0.177, 0.22 and 0.25in) remained common in Britain and 4.4, 4.5, 5.5, 6.3 and 6.5mm in Germany, though special calibres could be obtained to special order. The 4.5 and 5.5mm (0.177 and 0.22in) calibres have become virtually universal since 1945, though the old No. 3 Bore (6.3mm, 0.25in) has recently enjoyed a limited renaissance accompanied by the smaller 5mm (0.20in) type. Each calibre has its peculiar advantages and drawbacks: 4.5mm is the most accurate, which may be due to better pellet quality, while 5.5mm retains its velocity better and has a longer range. Champions of the intermediate 5mm calibre claim to have an ideal combination of the other two.

Increased popularity of rifling, which increased range and improved accuracy, made the parallel-sided slugs obsolescent; the force required to engrave the large bore-contact areas in the rifling often greatly reduced velocities. A projectile with good sealing properties but minimal bore-contact was clearly needed, and the **diabolo** resulted. A claim to its invention is occasionally made on behalf of Rheinisch-Westfälische Sprengstoff AG (RWS, now Dynamit Nobel), working at the turn of the century, but the case lacks substance; 1914 remains a more plausible date, by which time diabolo pellets, marketed by Lincoln Jeffries & Co., had appeared in

Britain. The design of the pellet-making machinery is credited to an otherwise obscure inventor named Boulton.

Few radical alterations have yet been made to the basic diabolo design: apart from the development of efficient synthetic bodies, the greatest single advance has been the introduction of the flathead German-style pellets, which have replaced the English roundhead style for competition shooting. The flatheads, though usually no better made than the roundheads, cut neater holes in paper targets (facilitating scoring) and permit a long bearing surface between the head and skirt. They are less likely to tip in the bore, but the roundheads are more accurate at long range and have better wind-riding qualities.

PROJECTILE TYPES

Balls are made by many manufacturers, usually for use in BB guns. Haendler & Natermann makes the greatest range – 3.3-8.6mm in 0.05mm increments – and balls may be obtained as pure lead, lubricated lead, copper-plated lead, brass-plated lead, nickelled lead or steel-shot.

Darts are still made by companies such as Millard Brothers and Bildstein, Mommer & Co. Few advances have been made since the nineteenth century, apart from the development of synthetic fibre flights; however, the re-usable synthetic Sussex Armoury Ballistic Bolt has unique flights to spin the projectile in flight and achieve quite good accuracy at 10m or more. (Several 5-dart groups of less than 10cm were shot at 10m during tests.) The Bolt may be used in smooth or rifled bores and is the greatest innovation in this class for fifty years.

Slugs, suited to smoothbores, are still available for special purposes. Haendler & Natermann's range includes seven calibres, and the rifled US Sheridan fires a slug (the Bantam) with a small basal sealing ring.

Diabolo pellets may be roughly classified as round- (English) or flat- (German) headed. **Roundheads** are widely made by British companies, such as Lanes, Eley and Millard Brothers, but also by Haendler & Natermann, Bildstein, Mommer & Co. and others in Europe. The pellets are invariably ribbed on body or skirt; their bodies are short, increasing the likelihood of tipping in the bore, but often display excellent manufacturing quality and very good tolerances (particularly the Eley Wasp). Less popular now than twenty years ago, the roundhead has been superseded by the flathead for target shooting. **Flatheads** are popular for target and general-purpose usage; generally longer-bodied than roundheads, they are less prone to instability in the bore. Manufacture is confined to the principal German companies, L. J.

Cammell Ltd, Hasuike Seisakusho and a few others. Plain or ribbed bodies are made in almost equal proportion, though the former predominates for competition work. The waists of the pellets are usually closer to the head than the base, though the distinctive Bimoco Elite has a medial waist. **Half-roundheads** can be a useful compromise between the good carrying properties of the roundhead and the widely spaced bearing surfaces of the flathead.

Pointed-head pellets were designed for hunting, greater long-range accuracy and increased penetration, but are often unstable at subsonic velocities and inaccuracy may arise from damaged or off-centre points. The Haendler & Natermann Silver Streak (or Verminkiller) has a strong ribbed skirt, while the RWS Superpoint has a beautifully made, but very thin-walled and easily deformed, plain skirt. Several designs such as the Cammell Champion Hunter and the Sussex Armoury (Lanes) Jackal Pointed, originally with a needle point, have a blunted nose to prevent damage in packing.

Special Designs. The Bimoco Spitz/Neue Spitz series has a very short flared skirt beneath a short parallel-sided body, and an almost flat head with a slight point. The idea is old (Cook's patent, 1912), the execution modern; claims to novelty include especial suitability for short-barrelled guns, though the pellets work quite normally in rifle-length barrels. The multi-flange head, patented by John Lane in 1929 (GB 308,943), has been revived by Hasuike Seisakusho and Bildstein, Mommer & Co. as the Silver Jet/Jet series and the Bimoco Silver Streak. Many differing advantages have been claimed for this design, the most plausible concerning improved head support and minimal in-bore instability. The pellets are no more accurate than flat- or round-headed varieties of comparable quality, and the increased bore-contact areas – despite the decreased resistance offered by the small-diameter ribbed skirt – may reduce velocity, depending on the gun and rifling design.

Sub-diameter body pellets, such as the Crosman Super-Pells and the Lane Specials generally perform similarly to standard diabolos, though the reduced-diameter section sometimes permits greater length for given weight. Long-head diabolos are usually adaptations of flatheads, like the H&N Barakuda (otherwise known as the Beeman Kodiak), and are often extremely heavy. The recent appearance of the 5mm/0.20in Bimoco-Normay Vixen 'semi-wadcutter' pellet – a misleading designation – may, however, indicate future trends. The smooth parabolic head and short plain skirt of this interesting pellet may offer improved long-range performance, though the bearing surfaces are rather close together and accuracy may suffer.

Virtually all pellets are made from an alloy of lead, antimony and other elements. Lead has a low melting point (327°C), high malleability and other attractive properties, but it is toxic and several synthetic-body pellets have been developed. The best known is the Prometheus, designed by Hugh Earl and now marketed by Millard Brothers, which has a stainless steel head/core set in a PTFE (Polytetrafluoroethylene) skirt, one of the few recent developments in pellet technology. The pointed head gives awesome penetration, but great

danger lies in ricochets and inadequate safety precautions. Whether the current form of the head is especially beneficial is debatable considering the proven excellence of **expanding-point** hunting bullets, and arguments of penetration against 'stopping power' will undoubtedly continue. The new Beeman Silver Bear has a deeply sunk head cavity, which is claimed to assist expansion against game.

The most popular pellet-making process places caps or discs punched from lead foil or wire between rotating discs. As the discs rotate, the pellet-shape is transferred from the circumferential dies to the lead cups. A few companies, including Benjamin and L. J. Cammell, use variations on this or other systems, but the end products look and perform much the same. Casting individual pellets in moulds is not exploited commercially, though it may be done on a small scale with moulds made by L. E. McQuire (LEM) of Blackpool. Ball ammunition is still made by 'dropping' in a shot-tower, pressing in a die or similar process. Most pellets are delivered from a metered hopper into tins of up to 500, though plastic dispensers, sometimes inconvenient and inefficient, have been used extensively by Crosman, Sheridan and the Sussex Armoury. The Sussex Armoury's circular transparent-lid pellet dispenser, originally developed by Lanes, is among the best dispenser systems; its self-adhesive base permits it to be attached to the gun stock. The Japanese Silver Jets come in a cardboard box containing an expanded polystyrene block, which gives unusually good protection. Battered pellets are less common in these boxes than in most tins. Top-grade match pellets by Bildstein, Mommer & Co., Haendler & Natermann, Dynamit Nobel (RWS brand) and Stiga are usually individually sized and packed to ensure consistent shooting.

PERFORMANCE

This depends greatly on the consistency with which tolerances of weight, overall length and the diameters of head and skirt are held, together with the quality of the pellet material; though rotation in the rifling can minimize poor weight distribution, it may not always compensate completely. Problems may arise when the output of several similar pellet-making machines is collected and indiscriminately fed into the tins from a central packaging system. As the machines will not function identically, the contents of each tin may be subject to the greater variations of weight and size than those fed from a single machine. At least two tins of pellets acquired during trials contained two different types of pellet: two distinct groups of overall lengths, though weights and head/skirt diameters remained comparable. Accuracy problems were only eliminated when these pellets were carefully measured and selected before firing. Measurements will also vary from batch to batch, day to day and year to year, particularly when manufacturers periodically revise their products to satisfy changing markets.

Experimental results suggest that minor variations in weight exert less influence on performance than the diameters of the skirt and, particularly, the head. Pellets displaying remarkably consistent weight sometimes

performed worse on trial than others displaying greater weight fluctuations but better dimensional tolerances. Seating or sizing pellets will usually improve performance by eliminating the effect of variable skirt diameter, though head diameter still plays its part. The diameter of the bore obviously remains constant, but the head of a small pellet will give less friction than a large or tight one and may not even fill the rifling grooves properly, leading to gas leakage. The more consistent the head diameter, the better the pellets will usually shoot provided that there are no obvious limiting factors.

The internal shape of the hollow diabolo appears to make little difference, assuming that the skirt walls are sufficiently thin to allow expansion; many Bimoco diabolos have a very small internal chamber compared with Haendler & Natermann or RWS types, yet their performance is not notably inferior. The external shape of

skirts and bodies also makes little significant difference to performance; plain- and ribbed-skirt Haendler & Natermann pellets, otherwise similar, display similar accuracy and velocity maintenance. Inferior accuracy in roundhead pellets often arises not from their inferior looking external finish (a poor guide to performance) nor from the short distance between the bearing surfaces, but simply from displacement of the head in relation to the skirt; flatheads of this type are much more rarely encountered.

The ballistic properties of diabolo pellets are still shrouded in mystery, but the flat- and round-nose types are generally regarded as more stable in the 500–800fs velocity range than the pointed pattern. However, little research has been done to highlight optimal pellet-head design and it is probable that there is a different head for each individual application.

PRINCIPAL PELLET MANUFACTURERS

Bildstein, Mommer & Co. (Bimoco)

D-5184 Gressenich über Stolberg/Rheinland, West Germany. UK distributor: Norman May & Co.; US distributor: Beeman's Precision Airguns (some types).

Founded in 1924 by Kaspar Lück, Mathias Bildstein and Peter Mommer, this lead and tin foundry registered as a company in 1925. Small-scale production resumed immediately after the Second World War had ended and the first pellets were made in 1952. Bimoco was employing 200 men by 1974 and exporting to more than forty countries.

L. J. Cammell (Merseyside) Ltd (Champion)

53 Borrowdale Road, Moreton, Wirral, Merseyside, England. Founded in Alexandria, Egypt, in 1920, this company switched its operations to England after the 1956 Suez Crisis had caused its owner, Luis Camilleri, to flee. Production recommenced in 1960. Many types of pellet are now made, most of which are exported.

Dynamit Nobel AG (RWS)

D-5210 Troisdorf/Oberlar, Haberstrasse 2 (Postfach 1209), West Germany. UK distributor: Leslie Hewett Ltd.; US distributor: various.

Rheinisch-Westfälische Sprengstoff AG was founded in Köln in 1886. It amalgamated with Dynamit Nobel AG in 1931. The latter had been founded in 1877 by the inventor of dynamite, Alfred Nobel, to succeed an earlier firm called Alfred Nobel & Co. Dynamit AG resumed its operations in 1948 and now makes RWS-brand airgun pellets in the Troisdorf factory.

Eley

PO Box 216, Witton, Birmingham B6 7BA, England. Eley was founded sometime prior to 1828 by William & Charles Eley. It became part of Explosives Trades Ltd in 1918 and then, in 1926, ICI. Imperial Metal Industries (IMI) was founded in 1962, when ICI was reorganized, and the Eley Ammunition Division of IMI (Kynoch) Ltd regained a measure of independence in 1977. Standard English-style roundhead pellets are made, and flathead match-grade types are imported from Germany.

Haendler & Natermann GmbH (H&N, Z&S)

D-3510 Hannover-Münden 1, August-Natermann-Platz

(Postfach 1280), West Germany. UK distributor: Frank Dyke & Co. Ltd., US distributor: Beeman's Precision Airguns and others.

Founded in 1825, H&N grew rapidly, employing 500 people by 1898. Haendler & Natermann AG registered in 1923 and began to make airgun pellets in 1935. Control passed from the hands of the family after the end of the Second World War, and Haendler & Natermann GmbH (dating from 1977) is now owned by Aluminium Walzwerke GmbH and Vereinigte-Deutsche-Metallwerke AG. Pellets are also made under the mark of Zieh- und Stanzwerke Schedetal, acquired by H&N in 1927.

Hasuike Seisakusho KK

4-6-21 Kamiji, Higashi-Nari-Ku, Osaka, Japan. UK distributor: Oliver J. Gower Ltd., US distributor: Beeman's Precision Airguns.

This company has been making a copy of Lanes' Triumph pellet, the Silver Jet, and a number of other designs – including a lightweight diabolo (the Lion or Beeman Laser) – since the 1960s.

Lanes Ltd

Cray Road, Footscray, Sidcup, Kent DA14 5BZ, England. The Lane Brothers originally traded from Bermondsey (London) and had a history they could trace back prior to 1854, when production of lead shot commenced. A vast number of different pellets and slugs have been made since 1900, including the Triumph of 1929–30 which provided the prototype for the now-popular Silver Jet. Lanes' products will be encountered under many brand-names, not least of which is that of the Sussex Armoury.

PELLET DESIGN KEY

Semi-flathead pellets

-  Plain
-  Ribbed-skirt
-  Ribbed-body

Semi-roundhead pellets

-  Plain
-  Ribbed-skirt
-  Ribbed-body

Roundhead pellets

-  Plain
-  Ribbed-skirt
-  Ribbed-body

Slug

-  Plain, pointed nose
-  Plain, sub-diameter pointed nose
-  Sub-diameter pointed nose, basal flange

Pointed-head pellets

-  Plain
-  Ribbed-skirt
-  Ribbed-body

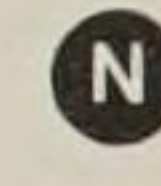
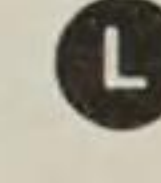
Semi-pointed head pellets

-  Plain
-  Ribbed-skirt
-  Ribbed-body

Flathead pellets

-  Plain
-  Ribbed-skirt
-  Ribbed-body

Ball

-  Plain lead
-  Brass-plated lead
-  Copper-plated lead
-  Nickel-plated lead
-  Lubricated lead

Miscellaneous pellets

-  Sub-diameter body, short flared skirt
-  Multi-flange head, roundhead or pointed
-  Standard diablo with sub-diameter body
-  Parabolic head, short flared skirt
-  Parabolic or rounded head, diablo body (curved side)

PELLET WEIGHTS AND DIMENSIONS

These should be regarded as approximations, representative only of the test batches, because variations undoubtedly occur from day to day. It is impossible to draw any but the most general conclusions about the performance of a pellet-type when so much depends on limiting factors such as rifling profile and bore diameter. One 'test' undertaken by a leading magazine placed two apparently differing brands nearly twenty places apart on a guide to performance, without realizing, as the maker was later to confirm, that they were identical but for the packaging. Unwittingly, this supposedly scientific trial highlighted the differences that may be encountered in batches of the same pellets.

Weights. 25 pellets were weighed to a hundredth part of a grain to obtain an average, from which the standard deviation

and percentage deviation were obtained, using the confidence limits, as described on page 25. The '+ / -' figures represent the maxima and minima in the test sample.

Dimensions. The overall lengths and head and skirt diameters of 25 pellets were measured to the nearest ten-thousandth of an inch, though in the tables they have been reduced to thousandths. The standard deviation and percentage deviation were found as described above.

Note. For explanation of abbreviations used, please see page 8.

Ammunition Directory

CALIBRE 3.30 - 4.25mm (0.130-0.167in)

HAENDLER & NATERMANN

- **B** H&N Kugeln
- **C** **N** *Pkg*, 110t 250t 500t; *col*, usually red, black, white, but dependent on size; *wt*, various; *bd*, 130 to 167 in 002 increments.

CALIBRE 4.30mm (0.169in)

DYNAMIT NOBEL

- **RWS Punktkugel Nr. 7**
- Pkg*, 250t; *col*, green, black, silver; *wt*, uncertain; *bd*, 169nf.

CALIBRE 4.40mm (0.173in)

DYNAMIT NOBEL

- **C** **RWS Punktkugel Nr. 9**
- Pkg*, 250t; *col*, ochre, black, silver; *wt*, 7.94; *bd*, 173+001-001, 0.2 per cent; *rm*, figures for coppered type, whose tin-seals are marked 'Verkupfert' (coppered).

HAENDLER & NATERMANN

- **B** H&N-Kugel Nr. 9
- **C** **N** *Pkg*, 100t, 250t, 500t; *col*; uncertain; *wt*, 7.30; *bd*, 174+001-001, 0.3 per cent.

CALIBRE 4.45mm (0.175in) (BB)

A number of manufacturers – notably Crosman and Daisy – make steel shot in this calibre, principally for the American BB guns. The shot has a disconcerting tendency to ricochet and is sometimes even banned in Europe. Unfortunately, some of the BB guns rely on magnetic-feed systems, which will not work with nickelled lead balls.

CALIBRE 4.5mm (0.177in)

NORBERTO ARIZMENDI



Balines Diavolox

Pkg, 250cb; *col*, sky blue, white, red; *rm*, not tested.

BARBERBLADEFABRIK



Pallet (Abbey Diabolo, Black Box, Zero)

Pkg, 200pb, 500pb; *col*, black or black, yellow; *wt*, 8.21+0.10-0.09, 0.6 per cent; *loa*, 203+002-001, 0.3-0.4 per cent; *hd*, 178+003-001, 0.5-0.6 per cent; *sd*, 184+003-002, 0.5-0.6 per cent; *rm*, ribs shallow, but skirt strong.

BENJAMIN AIR RIFLE



Hi-Compression (H-C, HC)

Pkg, 250t, 500t; *col*, green, white; *wt*, 9.40; *loa*, 210+002-001, 0.5 per cent; *hd*, 174+001-001, 0.2-0.3 per cent; *sd*, 186+001-003, 0.4 per cent; *rm*, offers average quality, with reasonably close head tolerances.

BILDSTEIN, MOMMER



Bimoco Diabolo (Aka Diabolo)

Pkg, 100t, 200t?, 500t; *col*, green, black or plain green; *wt*, 7.88+0.22-0.09, 0.8-0.9 per cent; *loa*, 196+001-002, 0.2-0.3 per cent; *hd*, 178+001-002, 0.5 per cent; *sd*, 184+001-002, 0.5 per cent; *rm*, figures for ribbed ('Geriffelt') pellets.



Bimoco Diabolo Engländermodell

Similar to the standard Bimoco Diabolo, but an English-style pellet.



Bimoco Elite (Bimoco Master or Match)

Pkg, 100t, 200t?, 500t 100pb; *col*, olive green, black, silver; *wt*, 7.87+0.06+0.08, 0.4 per cent; *loa*, 201+001-001, 0.2 per cent; *hd*, 178+nsv-002, 0.2-0.3 per cent; *sd*, 185+002-001, 0.4 per cent; *rm*, selected examples are individually packed.



Bimoco Rundkugel

- **B** *Pkg*, 500t; *col*, sky blue, black; *wt*, about 8.1; *nd*, 177;
- **C** **N** *rm*, ball-type.

**Bimoco Silver Streak** (Normay Silver Streak)

Pkg, 100t, 200t?, 500t; *col*, green, black?; *wt*, $8.17 + 0.14 - 0.07$, 0.51 per cent; *loa*, $271 + 004 - 003$, 0.8 per cent; *hd*, $175 + 002 - 002$, 0.4–0.5 per cent; *sd*, $181 + 003 - 003$, 0.7–0.8 per cent; *rm*, a copy of the Silver Jet.

**Bimoco Spitzkugel**

Pkg, 500t; *col*, red, black; *wt*, $7.83 + 0.16 - 0.11$, 0.84 per cent; *loa*, $222 + 002 - 003$, 0.4–0.5 per cent; *hd*, $176 + 002 - 001$, 0.3–0.4 per cent; *sd*, $183 + 002 - 003$, 0.6–0.7 per cent; *rm*, an unusual design, claimed to be suited to short barrels.

**Bimoco/Normay Vixen**

A smaller version of the 5mm/0.20in Vixen, not yet available.

L. J. CAMMELL**Champion Hunter**

Pkg, 200cb, 500t; *wt*, $7.30 + 0.19 - 0.17$, 1.3 per cent; *loa*, $244 + 004 - 002$, 0.5–0.6 per cent; *hd*, $170 + 008 - 005$, 2.1 per cent; *sd*, $191 + 003 - 005$, 1.0 per cent; *rm*, well finished, but with very wide head-diameter tolerance. Very small head dimensions.

**Champion Olympic Match**

Pkg, 200cb, 500t; *col*, unknown; *wt*, $8.22 + 0.16 - 0.25$, 1.0 per cent; *loa*, $223 + 002 - 002$, 0.4–0.5 per cent; *hd*, $176 + 002 - 002$, 0.5 per cent; *sd*, $187 + 002 - 002$, 0.5 per cent; *rm*, a long match-type design (compare RWS Meisterkugeln, H&N Match).

**Champion Standard Roundhead** (Nickerson Roundhead)

Pkg, 200cb, 500t; *col*, red, blue, white; *wt*, $7.40 + 0.18 - 0.16$, 1.2–1.3 per cent; *loa*, $212 + 008 - 012$, 2.0–2.1 per cent; *hd*, $171 + 003 - 009$, 1.6 per cent; *sd*, $183 + 004 - 003$, 0.7–0.8 per cent; *rm*, a flattened or semi-roundhead pellet with a small head diameter and poor tolerances, though quite well finished.

CROSMAN**Crosman Super-Pell**

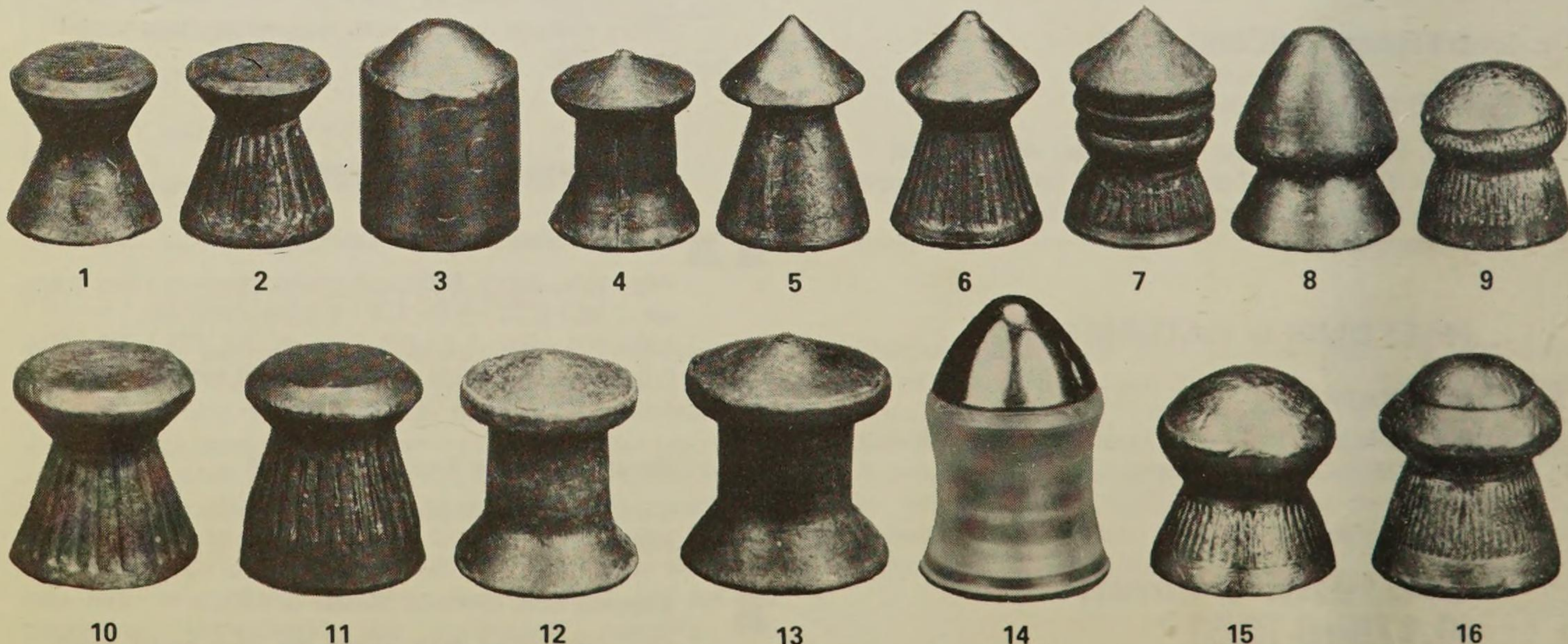
Pkg, various; *col*, red, white; *wt*, 8.25; *rm*, not tested; a plain-bodied pellet similar to the Smith & Wesson and Lanes Special, with a short ribbed medial section.

DAISY**Daisy Diabolo**

Pkg, 500pb; *col*, yellow, white, black; *wt*, 7.47; *loa*, $206 + 002 - 003$, 0.6–0.7 per cent; *hd*, $177 + 001 - 001$, 0.2–0.3 per cent; *sd*, $185 + 005 - 003$, 0.8 per cent; *rm*, figures for 'Superior Match Grade' pellets.

DYNAMIT NOBEL**RWS Diabolo**

Pkg, 100t, 200t, 500t; *col*, dark green, silver, black; *wt*, $7.92 + 0.07 - 0.05$, 0.4 per cent; *loa*, $209 + 005 - 004$, 0.7–1.0 per cent; *hd*, $176 + 001 - 001$, 0.3–0.4 per



A selection of typical pellet shapes: 1, 4.5mm Bimoco Elite, medial waist, plain body diabolo, match quality; 2, 4.5mm Stiga Dogg Match, ribbed skirt diabolo, good match pellet; 3, 5mm Sheridan Bantam, a parallel-sided pellet with basal flange; 4, 4.5mm Bimoco Spitzkugel; 5, Dynamit Nobel 4.5mm RWS Superpoint, plain body, pointed head diabolo hunting pellet; 6, Haendler & Natermann 4.5mm Pointed or 'Verminkiller' hunting pellet; 7, 4.5mm Bimoco Silver Streak, which is a copy of the Hasuike Seisakusho Silver Jet; 8, 5mm Bimoco/Normay Viper, which has a special, wide parabolic head; 9, Barberbladfabrik 4.5mm Zero; 10, 4.5mm RWS Diabolo, standard German-style long bodied flathead pellet; 11, 5.5mm Daisy Diabolo 'Superior Match Grade' pellet; 12 and 13, 6.35mm Bimoco Neue Spitzkugel, supposedly suited to short barrels; 14, 5.5mm Prometheus, with PTFE body and stainless steel head; 15, 5.5mm Eley Wasp, a standard English-style short-bodied roundhead pellet; 16, Cammell 5.5mm Champion Standard Roundhead.



cent; *sd*, 187 + 001 – 002, 0.4 – 0.5 per cent; *rm*, good quality, with the reinforced RWS base; often performs well.



RWS Hobby

Pkg, 200rpb, 500rpb; *col*, apple green, red, black; *wt*, 7.00 + 0.09 – 0.06, 0.5 per cent; *loa*, 205 + 003 – 002, 0.5 – 0.6 per cent; *hd*, 177 + 001 – 002, 0.3 – 0.4 per cent; *sd*, 187 + 003 – 005, 0.6 – 0.8 per cent; *rm*, a lighter and cheaper version of the RWS Diabolo; poorer quality.



RWS Meisterkugel (RWS Match)

Pkg, 100t, 200t, 500t, 100pb; *col*, yellow, black, silver (tin), yellow, black, white, red (box); *wt*, 8.39 + 0.03 – 0.05, 0.2 per cent; *loa*, 217 + 002 – 002, 0.4 – 0.5 per cent; *hd*, 177 + 001 – 001, 0.2 – 0.3 per cent; *sd*, 185 + 001 – 002, 0.3 – 0.4 per cent; *rm*, figures for tinned pellets; very high quality, rejected if they fail to group 4.5mm ctc (boxed) or 7.5mm ctc (tinned).



RWS-Punktkugel Nr. 11

Pkg, 250t; *col*, sky blue, black, silver; *wt*, 8.34; *dia*, 176 + 001 – 001, 0.3 – 0.4 per cent; *rm*, figures for plain lead version; coppered type has 'Verkupfert' tin-seals.



RWS Superpoint

Pkg, 500t, 500rpb; *col*, sky blue, red, black, silver; *wt*, 7.90 + 0.09 – 0.08, 0.5 per cent; *loa*, 271 + 003 – 002, 0.4 – 0.5 per cent; *hd*, 176 + 002 – 001, 0.4 – 0.5 per cent; *sd*, 187 + 002 – 005, 0.8 – 0.9 per cent; *rm*, very well made, but skirt thin and easily deformed in transit; good accuracy from undamaged pellets.

ELEY



Eley Match

Pkg, 500t, 200tb?; *col*, white, black, red; *wt*, 8.00 + 0.06 – 0.05, 0.3 per cent; *loa*, 214 + 002 – 001, 0.3 – 0.4 per cent; *hd*, 177 + 001 – 001, 0.2 per cent; *sd*, 187 + 002 – 003, 0.4 – 0.5 per cent; *rm*, made in Germany to marginally differing British specifications; very similar to H&N Match pellets.



Eley Wasp (BSA Pylarm)

Pkg, 200t, 500t; *col*, red, black, white (Wasp), red, yellow, and black (Pylarm); *wt*, 7.60 + 0.22 – 0.14, 1.2

per cent; *loa*, 204 + 003 – 003, 0.2 – 0.3 per cent; *hd*, 179 + nsv – 001, 0.1 – 0.2 per cent; *sd*, 187 + 003 – 003, 0.6 – 0.7 per cent; *rm*, perhaps the best available English-style pellet; length varies from batch to batch (198-207), but rarely within tins, and weight variation did not reflect in performance.

INDUSTRIAS EL GAMO



Bolas Metallicas

Pkg, 500t; *col*, green, white, black; *nd*, 177; *rm*, not tested.



Balines Tipo A

Pkg, 250cb, 250t, 500t; *col*, blue, white, black or beige, black, red and white (tin), white black and five shades of blue (box); *wt*, 7.97; *loa*, 203 + nsv – 001, 0.1 – 0.2 per cent; *hd*, 174 + 003 – 002, 0.7 per cent; *sd*, 188 + 002 – 002, 0.4 per cent; *rm*, a German-style ('Tipo Alemana') pellet.



Balines Tipo C

Pkg, 250cb; *col*, white, black, yellow, orange and brown; *rm*, not tested; a version of the cylindrical Sheridan slug ('Tipo Conicos').



Balines Tipo I

Pkg, 500t; *col*, blue/white, black; *rm*, an English-style ('Tipo Inglés') pellet; not tested.

HAENDLER & NATERMANN



H&N Diabolo Engländer-Ausführung

Pkg, 100t, 200t, 500t; *col*, green, white, black or green, black; *rm*, a standard English-style pellet; not tested.



H&N Diabolo Wettkampfkugel (Z&S Diabolo)

Pkg, 100t, 200t, 500t; *col*, green, white, black or (Z&S) red, black; *wt*, 7.25 + 0.14 – 0.18, 0.9 per cent; *loa*, 208 + 003 – 003, 0.6 – 0.7 per cent; *hd*, 178 + 001 – 001, 0.2 – 0.3 per cent; *sd*, 185 + 003 – 003, 0.6 – 0.7 per cent; *rm*, quite good quality, with distinctive 'screwed' internal finish; tins of smooth-body pellets have 'Glatt' (smooth) seal, ribbed are 'Geriffelt' (ribbed).

H&N Match (Hy-Score Match, Competition, Individual, Master)

Pkg, 100t, 200t, 500t, 200tb; *col*, white/pale brown, black, red; *wt*, $7.87 + 0.06 - 0.04$, 0.2 – 0.3 per cent; *loa*, $210 + 001 - 001$, 0.2 – 0.3 per cent; *hd*, $178 + 001 - 001$, 0.2 per cent; *sd*, $187 + 001 - 002$, 0.3 – 0.4 per cent; *rm*, very good quality, lighter than RWS Meisterkugeln; see also H&N Diabolo for seal details.



H&N Pointed (Beeman Silver Sting or Silver Star, H&N Verminkiller, Z&S Pointed)

Pkg, 500t; *col*, red, black silver, or red, black; *wt*, $8.56 + 0.12 - 0.13$, 0.7 – 0.8 per cent; *loa*, $281 + 005 - 007$, 1.1 – 1.3 per cent; *hd*, $178 + 001 - 001$, 0.2 – 0.3 per cent; *sd*, $185 + 005 - 003$, 0.8 – 0.9 per cent; *rm*, strong ribbed skirt, though the points are not always perfect; length rather variable.



H&N Spitzkugel

Pkg, 100t, 200t, 500t; *col*, royal blue, black, white; *rm*, a traditional slug design, available in a wide range of sizes; not tested.

HASUIKE SEISAKUSHO



Jet (Beeman Jet, Zet, Mount Star Roundhead)

Pkg, 500t 500cb; *col*, N/A; *wt*, 8.12bf; *loa*, 220bf; *hd*, 177bf; *sd*, 185bf; *rm*, good quality; often more accurate than the pointed type, but less commonly available.



Mount Star Diabolo (Beeman Laser, Jet Diabolo, Laser, Lion?)

Pkg, 500t, 500cb; *col*, unknown; *wt*, 7.13bf; *loa*, 229bf; *hd*, 177bf; *sd*, 185bf; *rm*, a well made lightweight, usually giving increased velocities; quite accurate in still conditions.



Silver Jet (Beeman Silver Jet, Mount Star Pointed, Jet Magnum)

Pkg, 500cb; *col*, yellow/orange, green, red, white, black (Silver Jet), black/sky blue, silver (Beeman type); *wt*, $8.19 + 0.09 - 0.10$, 0.5 – 0.6 per cent; *loa*, $271 + 003 - 003$, 0.5 – 0.6 per cent; *hd*, $178 + 001 - 001$, 0.2 – 0.3 per cent; *sd*, $182 + 001 - 002$, 0.4 – 0.5 per cent; *rm*, good quality, excellent finish; the large contact area is not suitable for very low-power guns.



ITALGUNS



IGI Diabolo

Pkg, 500b; *col*, unknown; *rm*, not tested.

LANES



Beatall (Bulldog)

Pkg, 500t; *col*, white/navy blue, red; *wt*, $8.27 + 0.18 - 0.16$, 0.9 – 1.0 per cent; *loa*, $216 + 002 - 002$, 0.5 – 0.6 per cent; *hd*, $176 + 001 - 001$, 0.2 – 0.3 per cent; *sd*, $179 + 003 - 003$, 0.7 per cent; *rm*, cheap pellets offering acceptable quality.



Jackal Pointed

Pkg, 750ptu; *col*, white, black, green; *wt*, $7.38 + 0.27 - 0.19$, 1.5 per cent; *loa*, $242 + 001 - 002$, 0.2 – 0.3 per cent; *hd*, $175 + 001 - 001$, 0.2 – 0.3 per cent; *sd*, $187 + 002 - 003$, 0.8 – 0.9 per cent; *rm*, average quality; originally made with an easily-damaged sharp point. Made for the Sussex Armoury.



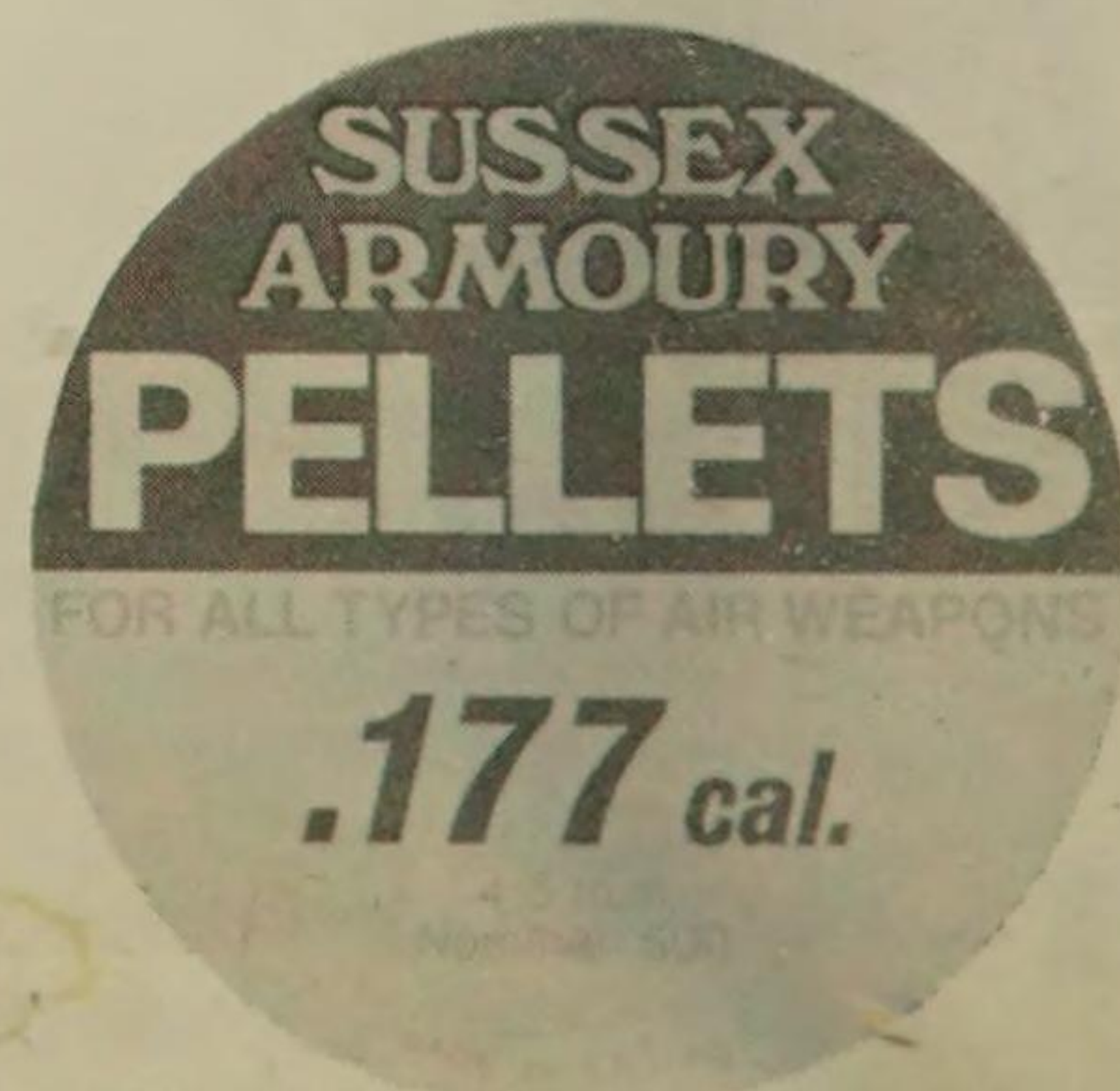
Lanes' Special (Sussex Armoury Magnum)

Pkg, 500t; *col*, silver, black (Lanes) red/white (Sussex Armoury) *wt*, 9.69 jg; *loa*, 258jg; *hd*, 174jg; *sd*, 191jg; *rm*, an unusual heavyweight pellet of unique design, ill-suited to low-power guns.



Sussex Armoury Standard

Pkg, 500t; *col*, white, light brown, pale green; *wt*, $9.28 + 0.10 - 0.13$, 0.6 per cent; *loa*, $223 + 003 - 003$,



0.7–0.8 per cent; *hd*, 176+001–nsv, 0.2–0.3 per cent; *sd*, 184+002–001, 0.4–0.5 per cent; *rm*, cheap pellets, but surprising quality; the broad head gives good support in the bore, though velocity is often reduced.

LINCOLN JEFFRIES



Marksman (Airship, BSA Besa)

Pkg, 500t; *col*, white, blue, red (Marksman); yellow, black or navy (Airship); white, red black (Besa); *wt*, 7.76; *loa*, 207+003–007, 1.0–1.1 per cent; *hd*, 176+001–001, 0.2–0.3 per cent; *sd*, 180+008–004, 1.3 per cent; *rm*, the cheapest pellets, not of particularly noteworthy quality; head tolerances adhered to well, but heads sometimes angled to skirts, ribs often poorly defined. Not tested.

MILLARD BROTHERS



Caledonian

Pkg, 100cb, 200cb, 250t, 500t, 500ptu; *col*, red, black, white; *wt*, 8.33+0.22–0.16, 1.1–1.2 per cent; *loa*, 204+001–001, 0.3 per cent; *hd*, 179+nsv–001, 0.2 per cent; *sd*, 188+003–003, 0.7–0.8 per cent; *rm*, good tolerances, though length varies from batch to batch (202–214): very shallowly ribbed.



Webley

Pkg, 250t, 500t; *col*, black, white, green; *wt*, 8.38+0.22–0.36, 1.7 per cent; *loa*, 209+002–004, 0.6–0.7 per cent; *hd*, 179+001–001, 0.3 per cent; *sd*, 187+003–002, 0.7–0.8 per cent; *rm*, very similar to Caledonian, but, if batch is typical, of marginally poorer quality.

POCISK



Pocisk Diabolo

Pkg, unknown; *col*, unknown; *rm*, from illustrations accompanying Polish Kl.170 pistol, very similar to Sussex Armoury Standard.

SMITH & WESSON



S&W Diabolo

Pkg, 250t; *col*, cream, blue; *rm*, not tested, an unusual plain-body design, with a coarsely ribbed medial section reminiscent of Lanes' Special.

STIGA AB



Dogg Match (Stiga Match)

Pkg, 50pb, 250t, 500t; *col*, yellow, silver; *wt*, 0.74+0.14–0.11, 0.7 per cent; *loa*, 217+004–004,

0.8–0.9 per cent; *hd*, 179+001–001, 0.3–0.4 per cent; *sd*, 191+003–003, 0.9–1.0 per cent; *rm*, excellent finish, very heavy; selected pellets (Tävlingskula) show better tolerances.



CALIBRE 5.05mm (0.200in) (usually known simply as 5mm)

BILDSTEIN, MOMMER

Bimoco-Sheridan-Torpedo

Pkg, 100t, 200t?, 500t; *col*, unknown; *rm*, a copy of the US Sheridan Slug.

Bimoco/Normay Vixen

Pkg, 500t; *col*, green, black?; *wt*, 9.38+0.08–0.06, 0.3–0.4 per cent; *loa*, 250+001–001, 0.1–0.2 per cent; *hd*, 196+003–003, 0.9–1.0 per cent; *sd*, 203+003–002, 0.8 per cent; *rm*, a very unusual design.

L. J. CAMMELL

Champion Standard Roundhead

Pkg, 200cb, 500t; *col*, red, blue, white; *wt*, 10.54+0.18–0.27, 1.1 per cent; *loa*, 256+005–010, 1.1 per cent; *hd*, 189+003–004, 0.9–1.0 per cent; *sd*, 203+002–004, 0.5–0.6 per cent; *rm*, better adherence to tolerances than the 4.5mm type; very small head diameter.

HAENDLER & NATERMANN



H&N-Kugel



Pkg, 100t, 250t, 500t; *col*, green, black, white?; *wt*, 11.4bf; *nd*, 201.



H&N Spitzkugel

A larger version of the 4.5mm Spitzkugel.



H&N Diabolo Engländer-Ausführung

A larger version of the 4.5mm. Not tested.



H&N Wettkampfkugel

Pkg, 100t, 200t, 500t; *col*, green, white and black; *wt*, 10.15bf; *loa*, 233bf; *hd*, 200bf; *sd*, 211bf.

HASUIKE SEISAKUSHO



Silver Jet (Beeman Silver Jet)

As 4.5mm version, except; *pkg*, 200cb; *wt*, 11.21bf; *loa*, 287bf; *hd*, 195bf; *sd*, 199bf; *rm*, rather small head diameter for some guns.

SHERIDAN PRODUCTS



Sheridan Diabolo (Sheridan Target)

Pkg, 500pb; *col*, red, white; *wt*, 13.1mf; *rm*, not tested.



Sheridan Bantam (Sheridan Slug)

Pkg, 500pb; *col*, yellow, black; *wt*, 15.14; *loa*, 269+008-006, 0.9-1.0 per cent; *hd*, 195+001-nsv, 0.1 per cent; *sd*, 199+002-002, 0.4-0.5 per cent; *rm*, this has a better ballistic coefficient than diabolos and, therefore, better velocity retention. It has excellent head-diameter tolerance, but the 'skirt' is very thin-walled and easily deformed.

CALIBRE 5.50mm (0.220in)

NORBERTO ARIZMENDI



Balines Diavolox

Pkg, 250cb; *col*, sky blue, white, red; *rm*, not tested.

BARBERBLADEFABRIK



Pallet (Abbey Diabolo, Black Box, Zero)

Pkg, 200pb, 250pb; *col*, black (Pallet), black, yellow (Zero); *wt*, 14.13+0.32-0.20, 0.8-0.9 per cent; *loa*, 244+004-003, 0.6-0.7 per cent; *hd*, 215+001-001, 0.3 per cent; *sd*, 227+004-005, 0.9-1.0 per cent; *rm*, different construction to the 4.5mm variety, with more consistent head tolerance.

BENJAMIN AIR RIFLE



Hi-Compression (H-C, HC)

Pkg, 250t, 500t; *col*, green, white; *wt*, 14.25; *loa*, 249; *hd*, 213; *sd*, 229; *rm*, offers average quality, with reasonably close head tolerances.

BILDSTEIN, MOMMER



Bimoco Diabolo (Akah Diabolo)

Pkg, 100t, 200t?, 500t; *col*, green, black or plain green; *wt*, 12.67+0.13-0.15, 0.5 per cent; *loa*, 236+008-006, 1.2 per cent; *hd*, 216+002-001, 0.3 per cent; *sd*, 223+002-002, 0.4-0.5 per cent; *rm*, figures for ribbed ('Geriffelt') pellets.



Bimoco Diabolo Engländermodell

Generally as 4.5mm version, but larger.



Bimoco Neue Spitzkugel

Pkg, 500t; *col*, red, black; *wt*, 12.94+0.17-0.18, 0.6-0.7 per cent; *loa*, 271+005-004, 0.91-1.0 per cent; *hd*, 217+002-003, 0.4-0.5 per cent; *sd*, 227+002-002, 0.5 per cent.

L. J. CAMMELL



Champion Hunter

Pkg, 500t; *col*, various; *wt*, 13.20+0.14-0.31, 0.6-0.7 per cent; *loa*, 255+004-006, 0.9-1.0 per cent; *hd*, 218+001-002, 0.4 per cent; *sd*, 230+004-003, 0.6-0.7 per cent; *rm*, quite good quality.



Champion Standard Roundhead (Nickerson Roundhead)

Pkg, 200cb, 500t; *col*, red, blue, white; *wt*, 14.31+0.24-0.28, 0.8-0.9 per cent; *loa*, 267+004-005, 0.8-0.9 per cent; *hd*, 217+002-001, 0.3 per cent; *sd*, 227+004-003, 0.8-0.9 per cent; *rm*, tolerances better than smaller type.

CROSMAN



Crosman Super-Pell

A larger version of the 4.5mm type; *rm*, not tested.

DAISY



Daisy Diabolo

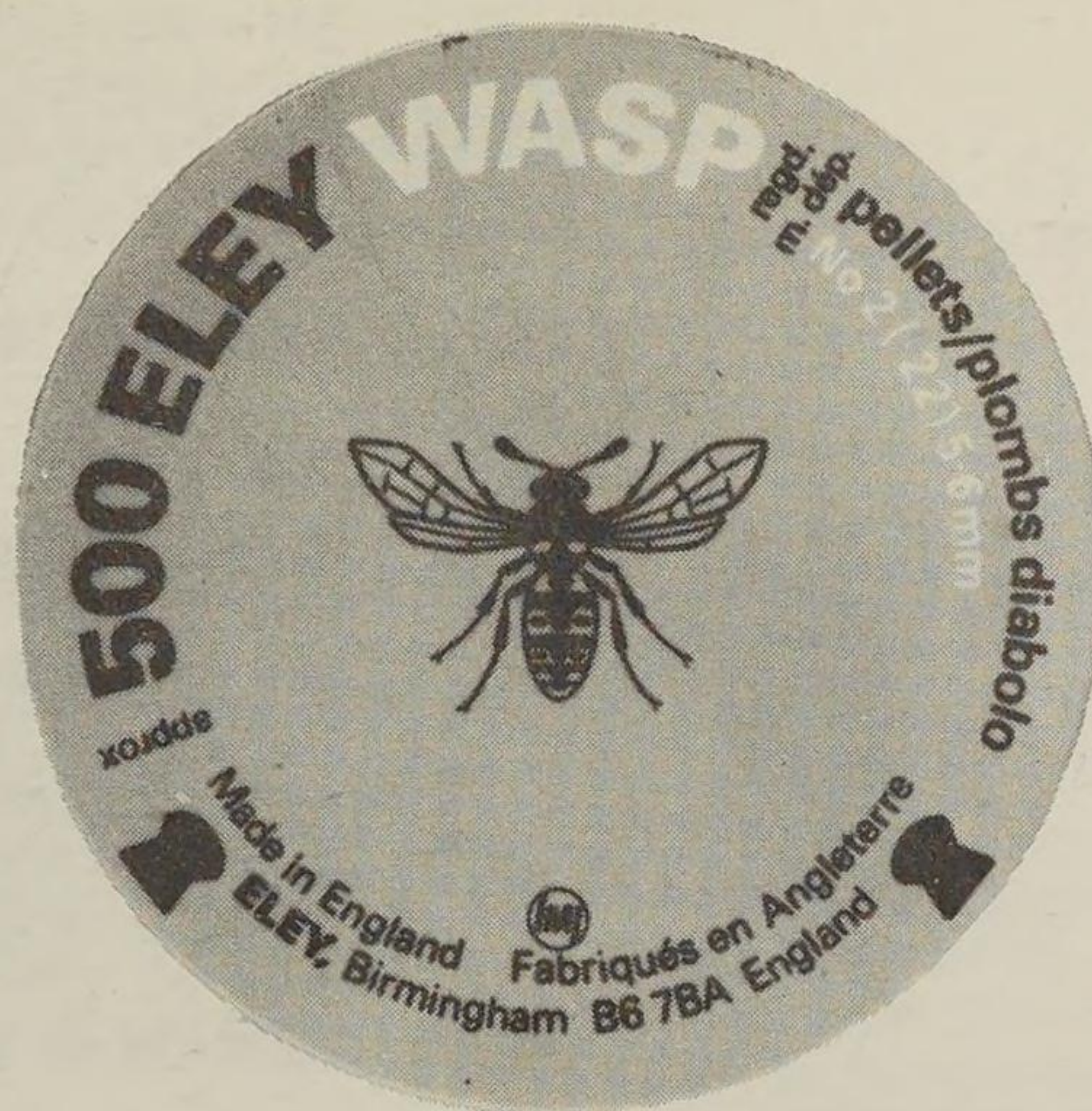
Pkg, 250pb; *col*, yellow, white, black; *wt*, 14.48; *loa*, 256+002-001, 0.2 per cent; *hd*, 216+002-002, 0.4-0.5 per cent; *sd*, 226+002-002, 0.4-0.5 per cent; *rm*, figures for 'Superior Match Grade' pellets.

DYNAMIT NOBEL



RWS Diabolo

Pkg, 100t, 200t, 500t; *col*, dark green, silver, black; *wt*, 13.97+0.07-0.08, 0.3 per cent; *loa*, 254+004-003, 0.4-0.6 per cent; *hd*, 217+002-001, 0.2-0.3 per cent; *sd*, 224+003-004, 0.7 per cent; *rm*, good quality.



RWS Hobby

Pkg, 200rpb, 500rpb; *col*, sky blue, red, black; *wt*, 12.11 + 0.20 – 0.21, 0.8 – 0.9 per cent; *loa*, 255 + 003 – 004, 0.7 per cent; *hd*, 217 + 001 – 003, 0.3 – 0.4 per cent; *sd*, 225 + 003 – 005, 0.8 – 0.9 per cent.



RWS Meisterkugel

Pkg, 500t; *col*, yellow, black, silver (tins), yellow, black, white, red (box); *wt*, 13.6mf; *loa*, 257; *hd*, 218; *sd*, 225; *rm*, good quality but rarely seen.

ELEY



Eley Wasp (BSA Pylarm)

Pkg, 500t; *col*, sky blue, black, white (Wasp), black, blue, orange (Pylarm); *wt*, 14.17 + 0.16 – 0.15, 0.5 per cent; *loa*, 253 + 001 – 002, 0.2 – 0.3 per cent; *hd*, 219 + 001 – 001, 0.3 per cent; *sd*, 227 + 002 – 005, 0.5 – 0.7 per cent.

INDUSTRIAS EL GAMO



Balines Tipo A

Pkg, 250t; *col*, blue, white, black or beige, black, red and white; *wt*, 12.84; *loa*, 244 + 002 – 001, 0.3 per cent; *hd*, 216 + 002 – 007, 0.9 – 1.0 per cent; *sd*, 233 + 004 – 003, 0.6 – 0.7 per cent; *rm*, a German-style pellet, see 4.5m version.

HAENDLER & NATERMANN



H&N Barakuda (Beeman Kodiak)

Pkg, unknown; *col*, unknown; *wt*, 22.03bf; *loa*, 343bf; *hd*, 216bf; *sd*, 217bf.



H&N Diabolo Engländer-Ausführung

Pkg, 100t, 200t, 500t; *col*, green, white, black, or green, black; *rm*, a standard English-style pellet; not tested.



H&N Diabolo Wettkampfkugel (Z&S Diabolo)

Pkg, 100t, 200t, 500t; *col*, green, white, black or (Z&S) red, black; *wt*, 14.27 + 0.33 – 0.30, 1.3 per cent; *loa*,

249 + 004 – 008, 1.1 – 1.2 per cent; *hd*, 216 + 003 – 002, 0.5 – 0.6 per cent; *sd*, 224 + 003 – 002, 0.5 – 0.6 per cent; *rm*, not as well finished as the visibly different 4.5mm type; figures for ribbed ('Geriffelt') pattern.

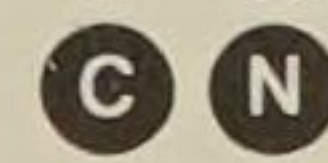


H&N Match

Pkg, 100t, 200t, 500t; *col*, white/blue, black, red; *wt*, 14.67 + 0.24 – 0.50, 1.1 per cent; *loa*, 259 + 008 – 005, 1.0 – 1.1 per cent; *hd*, 217 + 002 – 001, 0.3 – 0.4 per cent; *sd*, 226 + 004 – 006, 1.0 – 1.1 per cent; *rm*, figures for ribbed variety; H&N has reputedly improved the tolerances during 1980.



H&N-Kugel



Pkg, 100t, 250t, 500t; *col*, green, black, white?; *wt*, 16.1nf; *dia*, 220 + 002 – 002.



H&N Pointed (Beeman Silver Star or Silver Sting, H&N Verminkiller, Z&S Pointed.)

Pkg, 500t; *col*, red, black, silver, or red, black; *wt*, 15.43 + 0.39 – 0.46, 1.3 per cent; *loa*, 318 + 004 – 008, 0.8 – 0.9 per cent; *hd*, 216 + 001 – 002, 0.3 – 0.4 per cent; *sd*, 222 + 003 – 007, 0.9 – 1.0 per cent.



H&N Spitzkugel

Pkg, 100t, 200t, 500t; *col*, royal blue, black, white; *rm*, a traditional slug design available in a wide range of sizes; not tested.

HASUIKE SEISAKUSHO



Jet (Beeman Jet, Mount Star Roundhead, Zet)

Pkg, 250cb; *col*, N/A; *wt*, 15.01bf; *loa*, 266bf; *hd*, 215bf; *sd*, 218bf.



Mount Star Diabolo (Beeman Laser, Jet Diabolo, Laser, Lion?)

Pkg, 250cb, 250t; *col*, unknown; *wt*, 13.36bf; *loa*, 254bf; *hd*, 216bf; *sd*, 219bf.



Silver Jet (Beeman Silver Jet, Mount Star Pointed, Jet Magnum)

Pkg, 250cb; *col*, yellow/orange, green, red, white, black (Silver Jet), black/sky blue, silver (Beeman type); *wt*, 15.00bf; *loa*, 306bf; *hd*, 215bf; *sd*, 217bf.

LANES

Beatall (Bulldog)

A larger version of the 4.5mm; *rm*, not tested.

Jackal Pointed

Pkg, 500ptu; *col*, white, black, red; *wt*, 14.20 + 0.17 – 0.21, 0.6 – 0.7 per cent; *loa*, 285 + 003 – 005, 0.5 per cent; *hd*, 216 + nsv – 001, 0.1 – 0.2 per cent; *sd*, 229 + 004 – 005, 0.9 per cent.

Lanes' Special (Sussex Armoury Magnum)

A larger version of the 4.5mm version. *Pkg*, 400t; *wt*, 17.30jg; *loa*, N/A; *hd*, N/A; *sd*, N/A; *rm*, not tested.

Sussex Armoury Standard

Pkg, 500t; *col*, white, light brown, pale green; *wt*, 14.29 + 0.11 – 0.18, 0.5 per cent; *loa*, 265 + 003 – 007, 0.7 – 0.8 per cent; *hd*, 210 + 001 – 001, 0.2 – 0.3 per cent; *sd*, 226 + 003 – 002; *rm*, head diameter rather small for many guns.

LINCOLN JEFFRIES

Marksman (Airship, BSA Besa)

Pkg, N/A; *col*, white, blue, red (Marksman), yellow, black or navy (Airship), white, yellow, black, (Besa); *wt*, 13.26; *loa*, 241 + 006 – 007, 1.1 – 1.2 per cent; *hd*, 218 + 001 – nsv, 0.2 per cent; *sd*, 223 + 004 – 006, 1.0 – 1.1 per cent.

MILLARD BROTHERS

Caledonian

Pkg, 100cb, 200cb, 250t, 500t, 500ptu; *col*, red, black, white; *wt*, 13.40 + 0.24 – 0.19, 0.8 – 0.9 per cent; *loa*, 242 + 002 – 002, 0.3 – 0.4 per cent; *hd*, 218 + 001 – 001, 0.2 – 0.3 per cent; *sd*, 229 + 002 – 002, 0.3 – 0.5 per cent.

Webley (Kassnar)

Pkg, 250t, 500t; *col*, black, white, green; *wt*, 13.44 + 0.28 – 0.25, 0.8 – 0.9 per cent; *loa*,

244 + 003 – 004, 1.0 – 1.1 per cent; *hd*, 217 + 001 – 001, 0.2 – 0.3 per cent; *sd*, 226 + 002 – 003, 0.6 per cent; *rm*, virtually identical to Caledonian.

PROMETHEUS PELLETS

Prometheus

Pkg, 100pb; *col*, black; *wt*, 9.12 + 0.09 – 0.12, 0.5 per cent; *loa*, 347 + 005 – 004, 0.6 per cent; *hd*, 221 + 002 – 003, 0.4 per cent; *sd*, 228 + 003 – 001, 0.4 per cent; *rm*, an unusual plastic-body pellet with a stainless steel nose. Surprisingly good tolerances. Distributed by Millard Bros.

SMITH & WESSON

S&W Diabolo

Pkg, 250t, 500t; *col*, cream, blue; *rm*, not tested.

CALIBRE 6.33-6.35mm (0.249 – 0.250in)

BILDSTEIN, MOMMER

Bimoco Neue Spitzkugel (Beeman New Spitz)

Pkg, 500t; *col*, red, black; *wt*, 15.71 + 0.15 – 0.14, 0.4 – 0.5 per cent; *loa*, 287 + 003 – 003, 0.5 – 0.7 per cent; *hd*, 248 + 002 – 001, 0.3 per cent; *sd*, 250 + 003 – 002, 0.4 – 0.5 per cent.

L. J. CAMMELL

Champion Roundhead

Pkg, 350t; *wt*, 19.94 + 0.29 – 0.31, 0.7 per cent; *loa*, 277 + 004 – 012, 1.1 – 1.2 per cent; *hd*, 245 + 004 – 007, 1.0 – 1.1 per cent; *sd*, 260 + 007 – 007, 1.2 – 1.3 per cent; *rm*, well finished, but very wide tolerances.

HAENDLER & NATERMANN

● B H&N-Kugel

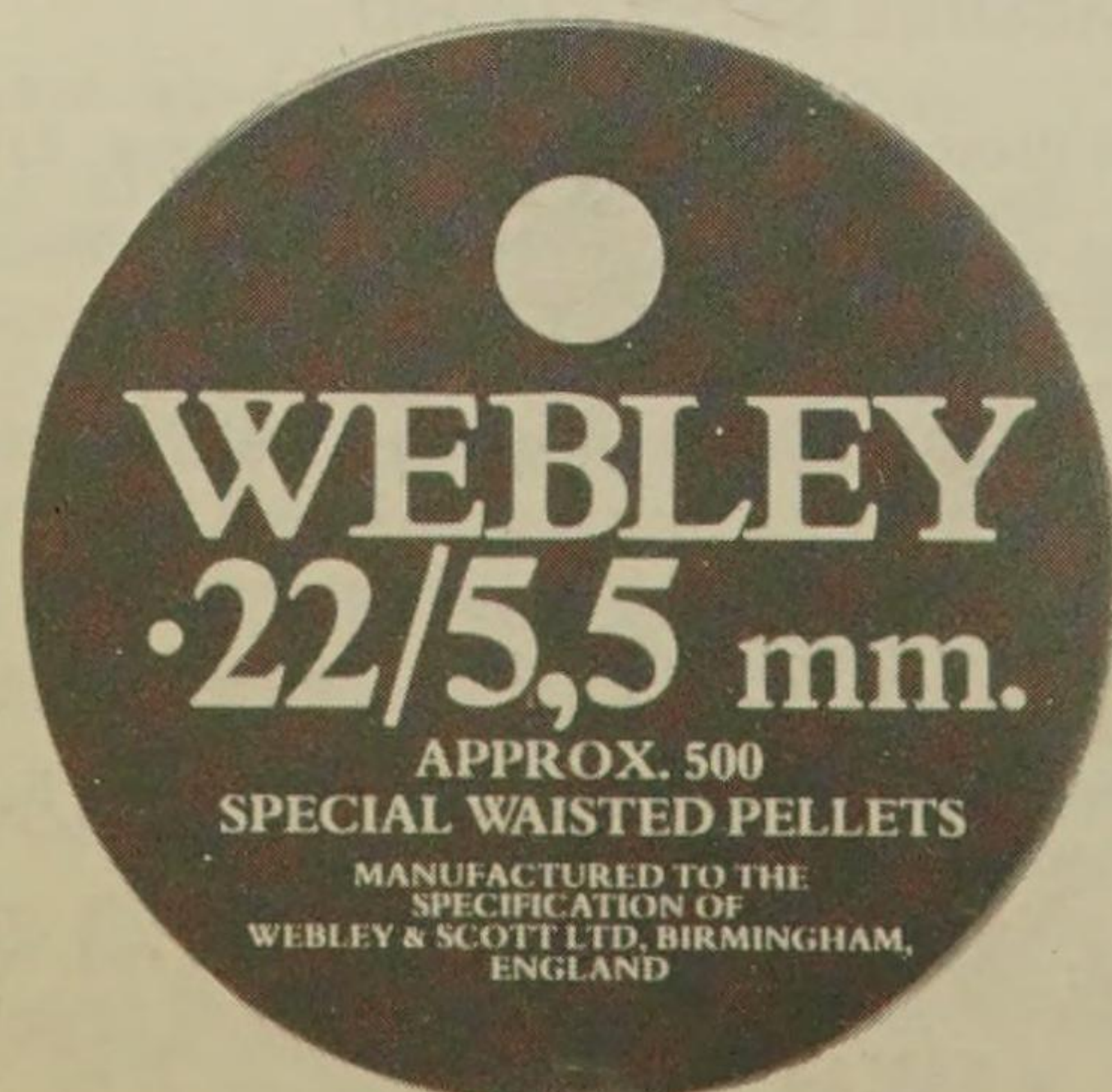
● C ● N *Pkg*, 100t, 250t, 500t; *col*, green, black, white?; *wt*, unknown; *nd*, 250.

■ H&N Spitzkugel

Pkg, 100t, 200t, 500t; *col*, royal blue, black, white; *rm*, a traditional slug design available in a wide range of sizes; not tested.

OTHER CALIBRES

Haendler & Natermann makes a wide range of lead balls, some with various metallic coatings, from 3.30 to 8.60mm diameter in 0.05mm increments (0.129-0.338in, in 0.002in steps). The company also makes slugs, H&N Spitzkugeln, in various calibres, including 5.05, 5.75, 6 and 6.25mm in addition to the standard types.



Appendices

APPENDIX 1. GUN PERFORMANCE: TYPICAL TEST RESULTS

The guns featured in this section – a selection of typical trial results – were lent, often for long periods, by tolerant manufacturers and distributors. Similarly, the pellets were supplied by companies that often went out of their way to be helpful. All test figures were obtained from a Skan Chronoscope.

Guns	Supplier(s)
Anschütz*	Frank Dyke & Co. Ltd, Gunmark Ltd.
Arizmendi Norica*	Oliver J. Gower Ltd.
Benjamin*	Sussex Armoury.
BSA	BSA Guns Ltd.
Crosman*	Sussex Armoury.
Daisy*	Millard Brothers Ltd.
Gun Toys*	Sussex Armoury.
Manuarm*	L. J. Cammell (Merseyside) Ltd.
Mayer & Grammelpacher*	Frank Dyke & Co. Ltd.
Milbro	Millard Brothers Ltd.
Sussex Armoury	Sussex Armoury.
Walther*	Accuracy International Ltd.
Webley	Webley & Scott Ltd.
Weihrauch*	Hull Cartridge Co. Ltd.

Pellets	
Bimoco*	Norman May & Co.
BSA*	BSA Guns Ltd.
Caledonian	Millard Brothers Ltd.
Champion	L. J. Cammell (Merseyside) Ltd.
Eley	Eley.
Daisy	Daisy Manufacturing Co.
H&N*	Frank Dyke & Co.
Lanes	Lanes Ltd.
RWS*	Leslie Hewett Ltd.
Silver Jet*	Oliver J. Gower Ltd.
Stiga	Stiga AB
Sussex Armoury*	Sussex Armoury.
Webley*	Webley & Scott Ltd.

*Indicates items acquired from distributors rather than the manufacturers.

The simplified graphical displays are intended to facilitate comparison between gun/pellet combinations. Each consists of a conventional trace (A) of the actual 25 shots fired in the test series, and the variable width of the constant-scale bands either side of the average velocity line (D) permits ready comparison between graphs. A key to the actual values of the lines accompanies each entry, but it is the *widths* rather than these true values that form the basis of the comparison system.

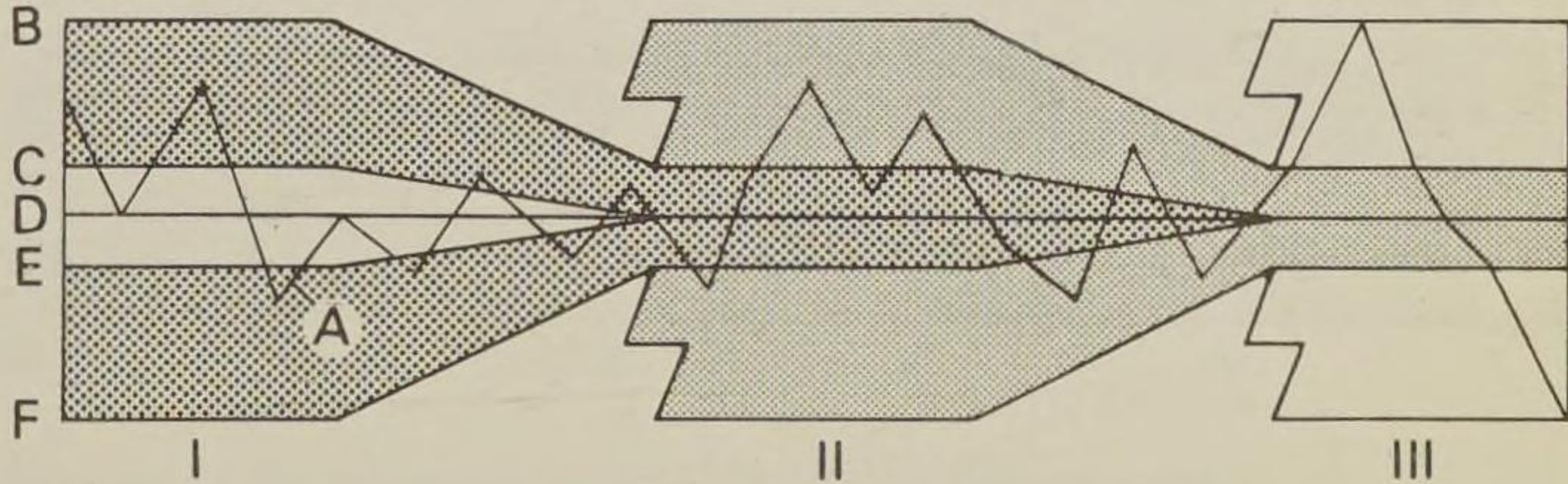
The band C-E nearest the average velocity line represents the Velocity Deviation Limit, while the entire width of the graph, B-F, is bounded by the highest and lowest velocities lying in the test sequence. The graphs, therefore, take the form:

- A Trace of the 25 shots fired during the trial
- B Highest velocity obtained during the trial (V_{mx})
- C Upper Velocity Deviation Limit (VDL +)
- D Average velocity line (V_x)

- E Lower Velocity Deviation Limit (VDL -)
- F Lowest velocity obtained during the trial (V_{mn})

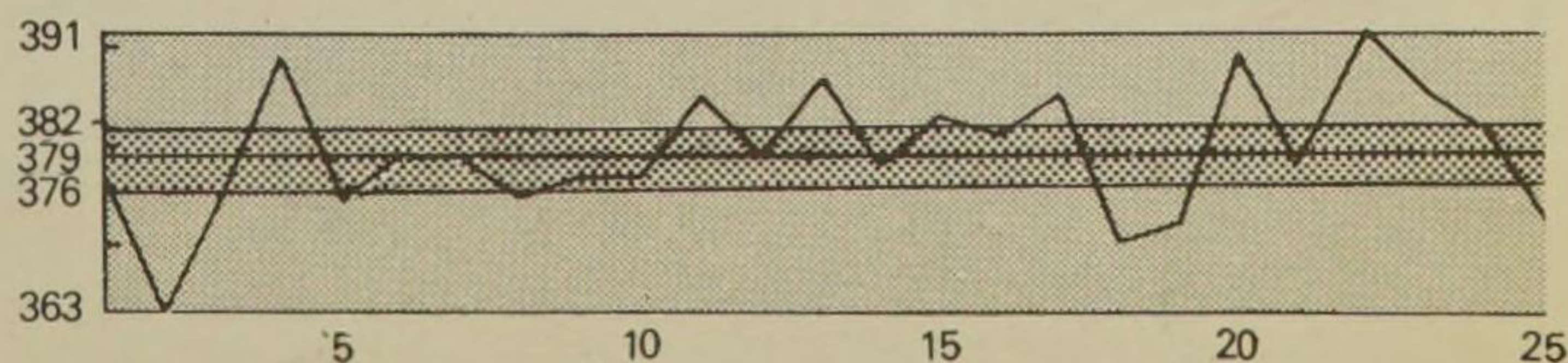
Three types of graph have been used to reflect the differing performances of the gun/pellet combinations. A single constant vertical scale could have been used, but would have given excessive vertical dimensions in the cases of poor performers. The graph types are:

Graph type	I	II	III
Vertical scale	1mm = 1fs	1mm = 2fs	1mm = 4fs
Performance class	good	average	poor
Performance limits (%VDL)			
rifles	above 0.99	2.49 – 1.00	below 2.50
pistols	above 1.99	2.99 – 2.00	below 5.00

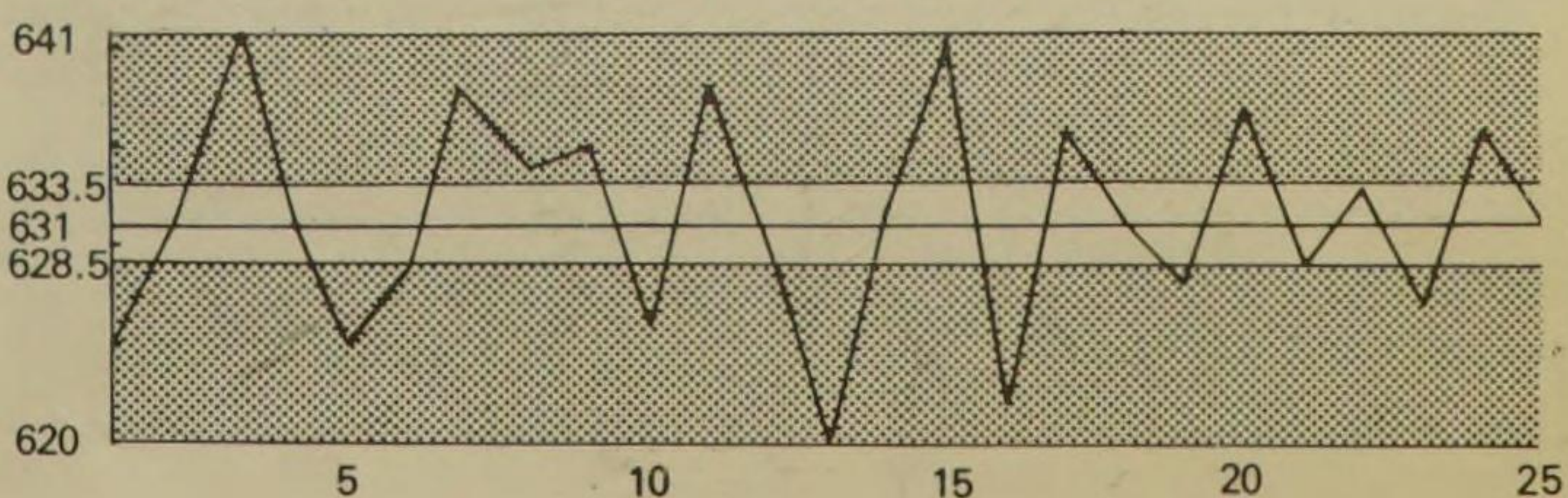


The graphs featured in this section are intended as a general guide to performances to be expected from a wide range of airguns, though they are not a particularly exhaustive survey. Several hundred trials were undertaken during research, and some of the guns featured by the graphs performed better (or in some cases, far worse) with different pellets or under different conditions. Consequently, the figures must *not* be used as guides to the best results obtainable from a BSA Mercury, Webley Vulcan, Original Diana 45 or any other gun. Together with the analytical procedures described in the earlier chapters, however, the graphical display provides the first standard mathematically acceptable system for obtaining and displaying the results of airgun trials.

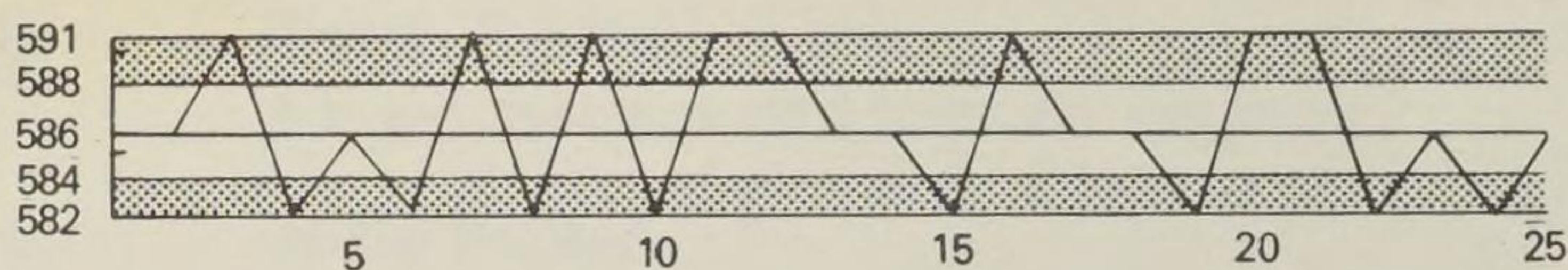
Anschütz LG275 (4.4mm/0.173in) RWS Punktkugeln Nr. 9: VDL 1.58%, GD 17.



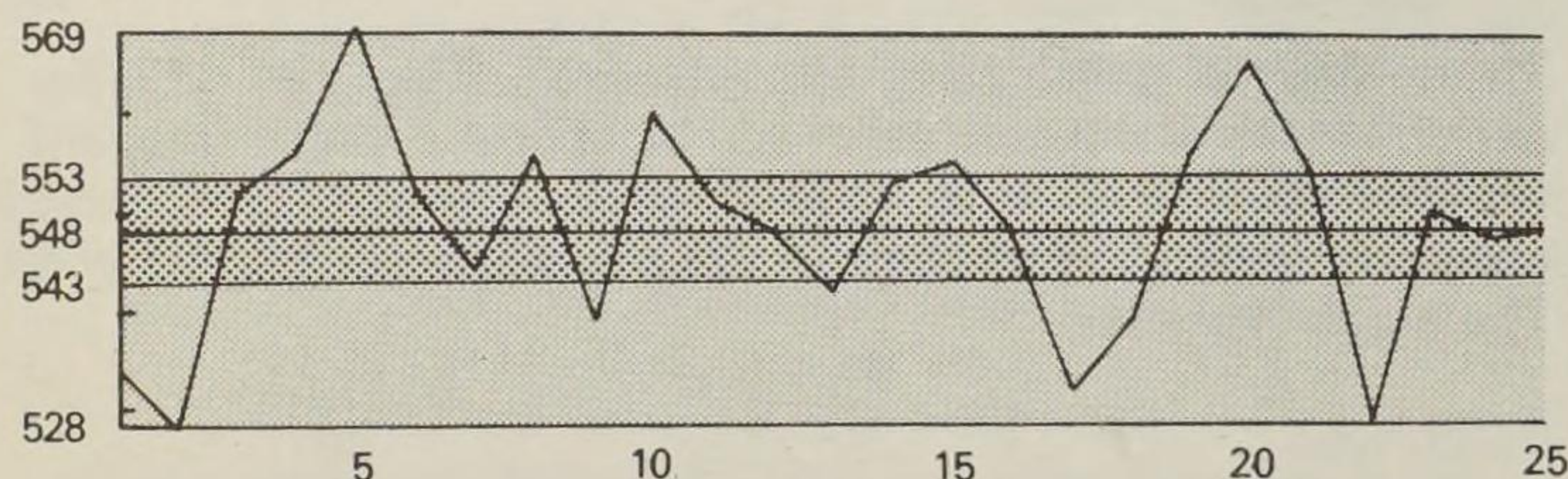
Anschütz LG335S (4.5mm/0.177in) RWS Diabolo: VDL 0.79%, GD 18. Best VDL: 0.67% (Eley Match, seated).



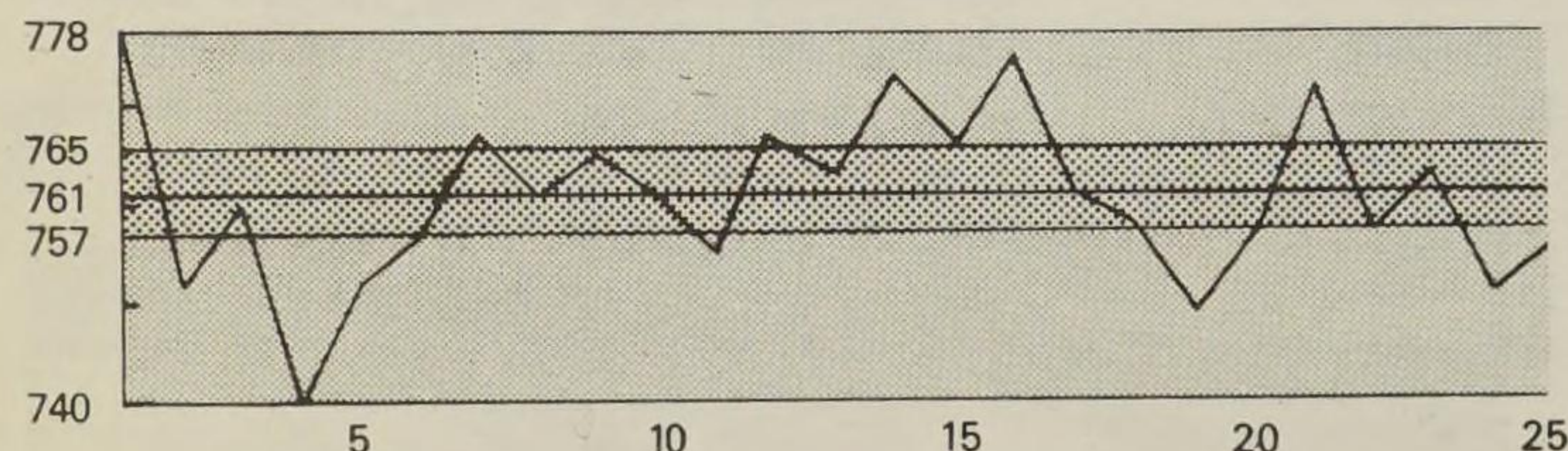
Arizmendi Norica Mo 61-C (4.5mm/0.177in) RWS Diabolo: VDL 0.57%, GD 9.



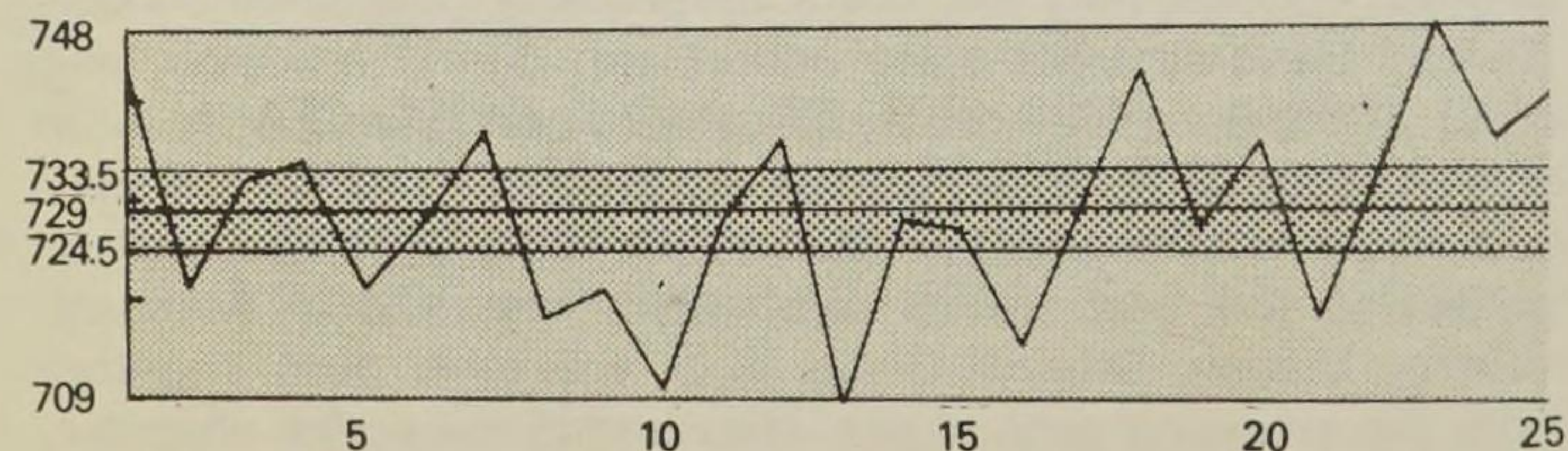
Benjamin M347 (4.5mm/0.177in) Eley Match, 8 pumps, valve exhausted after every shot: VDL 1.75%, GD 25. Best VDL: 0.71% (Eley Match, valve not exhausted – V_x 645fs with 8 pumps).



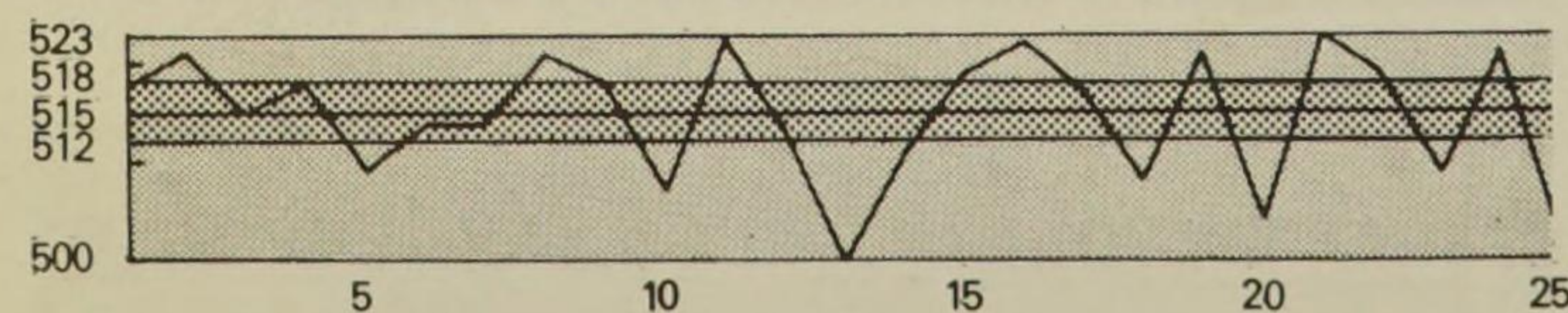
BSA Airsporter Mk 6 (4.5mm/0.177in) Eley Wasp: VDL 1.05%, GD 26.



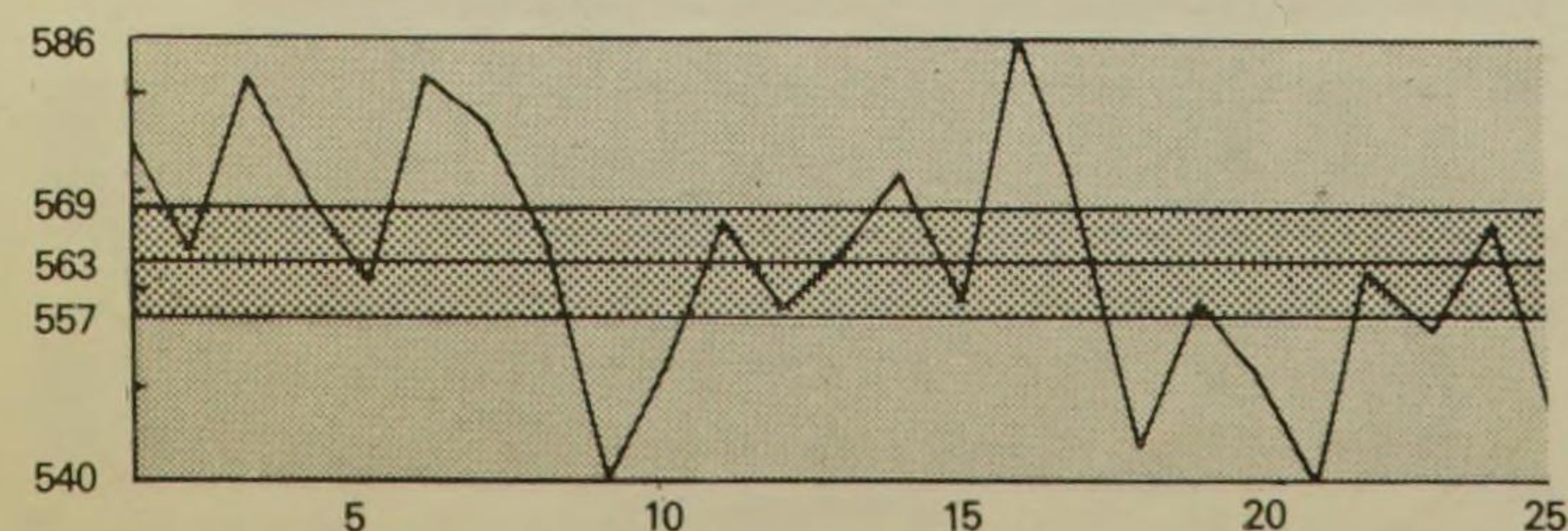
BSA Mercury Mk 3 (4.5mm/0.177in) Z&S Diabolo: VDL 1.28%, GD 25. Best VDL: 0.46% (Eley Wasp, seated).



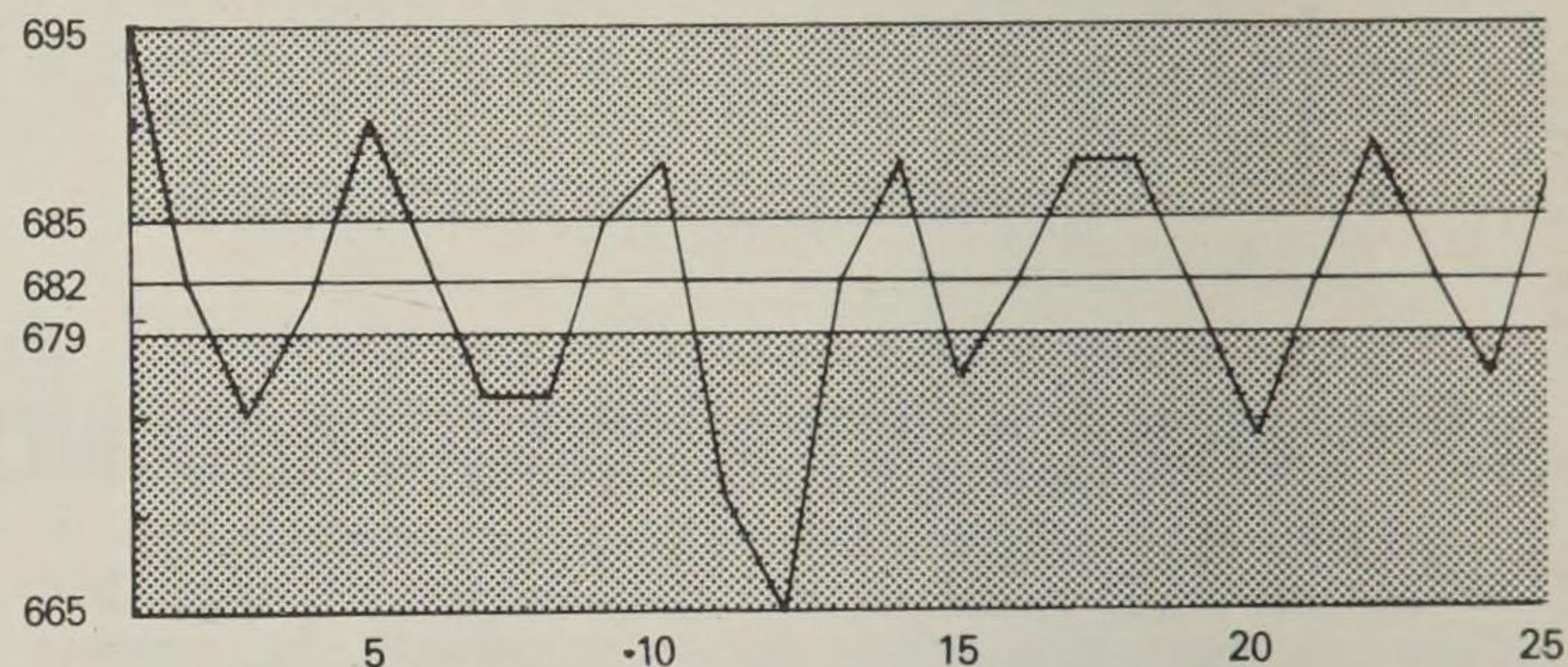
BSA Mercury Mk 3 (5.5mm/0.22in) H&N Verminkiller: VDL 1.19%, GD 19. Best VDL: 1.07% (H&N Match).



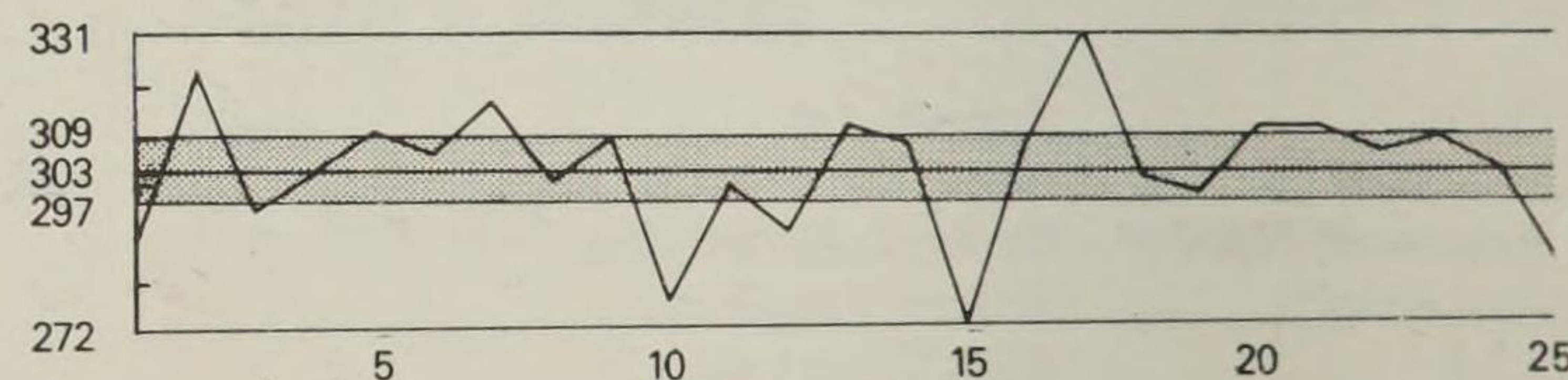
BSA Scorpion (4.5mm/0.177in) BSA Besa: VDL 2.04%, GD 28.



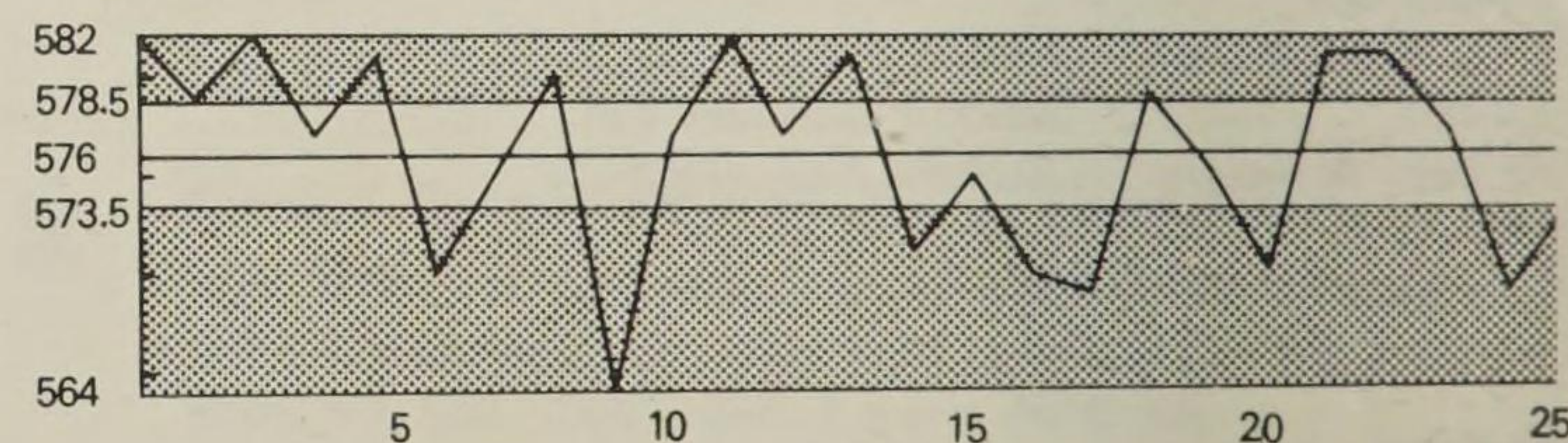
BSA Super Meteor Mk 5 (4.5mm/0.177in) Eley Wasp: VDL 0.91%, GD 17.



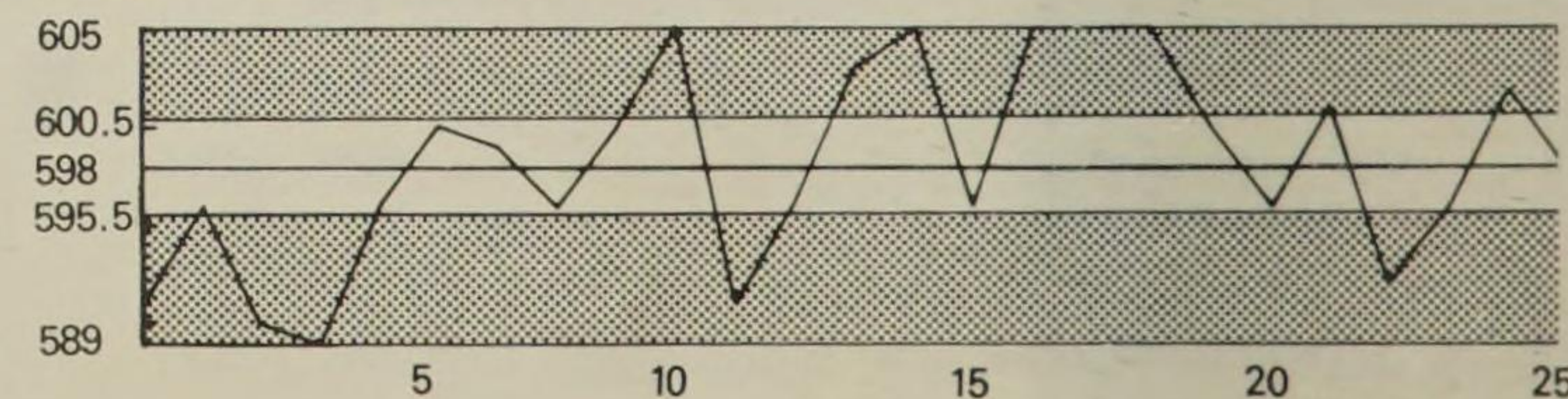
Crosman M1 Carbine (BB) RWS Punktkugeln Nr. 9: VDL 4.03%, GD 37.



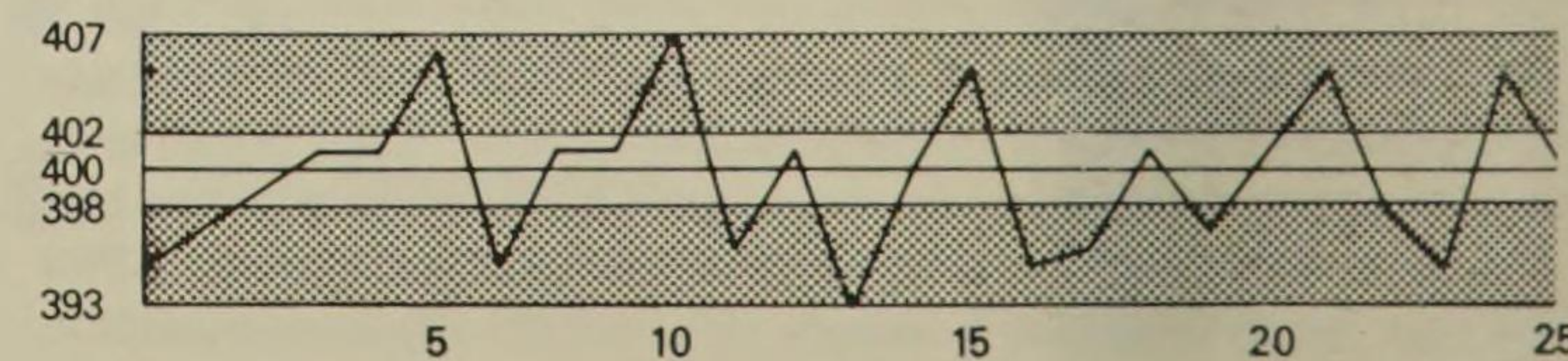
Crosman 760 Powermaster (4.5mm/0.177in) Bimoco Diabolo, 8 pumps: VDL 0.84%, GD 16. Note: a smoothbore example.



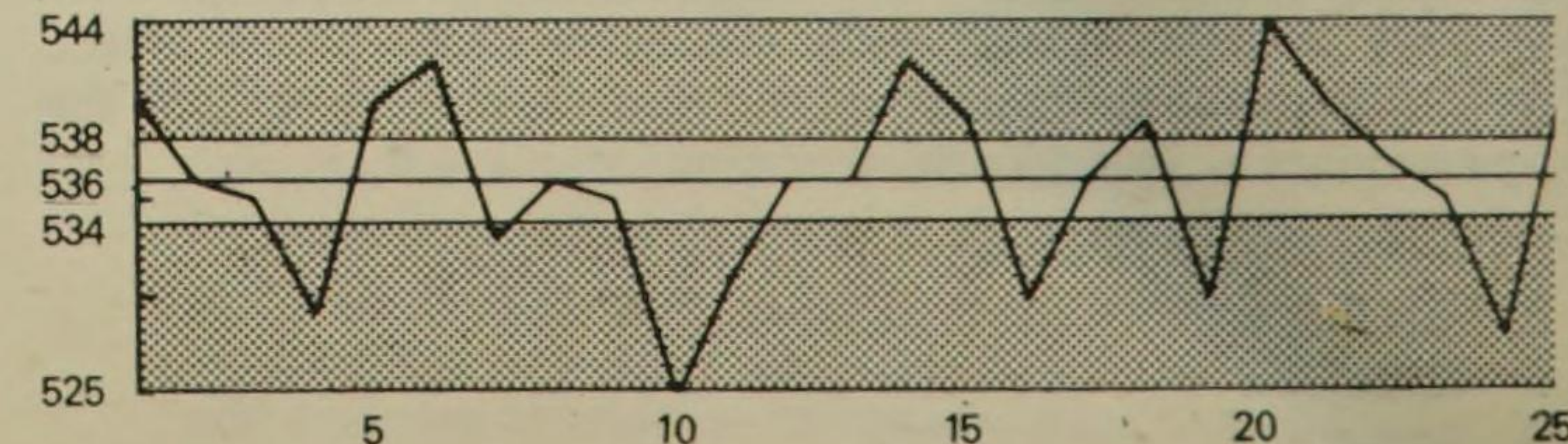
Crosman 766 American Classic (4.5mm/0.177in) Silver Jet, 8 pumps: VDL 0.77%, GD 14.



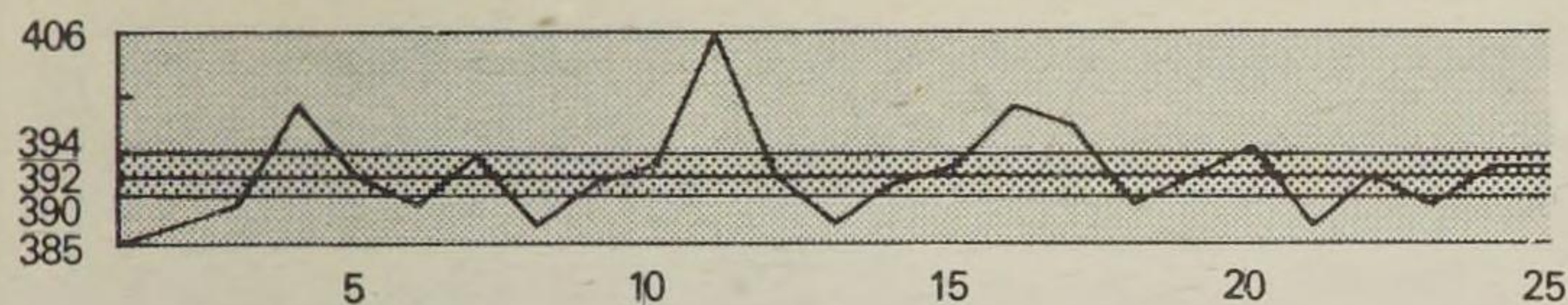
Crosman 1377 American Classic (4.5mm/0.177in) RWS Diabolo, 8 pumps: VDL 0.89%, GD 11. Note: lower-power British market version. Best VDL: 0.87% (RWS Diabolo, 10 pumps).



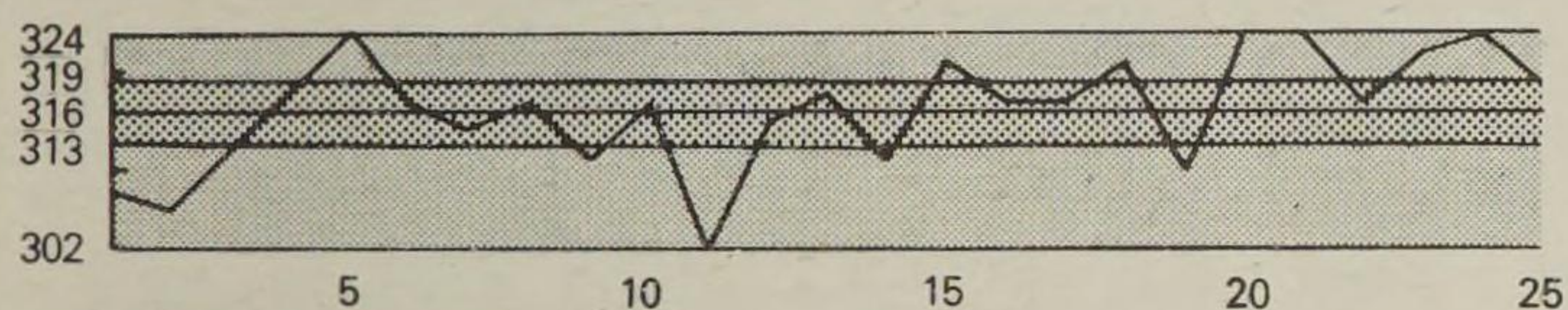
Crosman 2200 Magnum (5.5mm/0.22in) Bimoco Diabolo, 8 pumps: VDL 0.83%, GD 13.



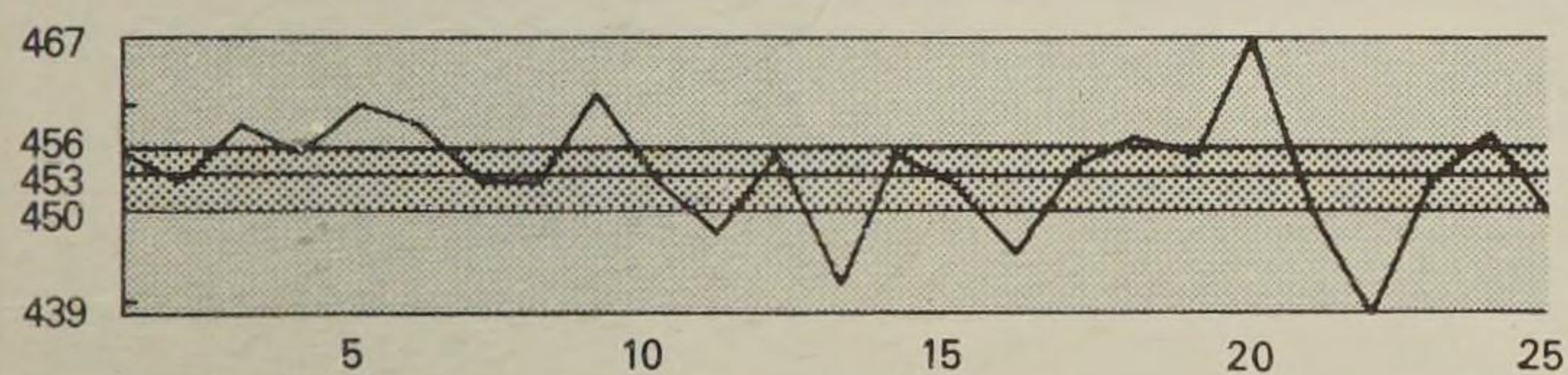
Daisy Powerline 717 (4.5mm/0.177in) Daisy Bullseye Match: VDL 1.08%, GD 14. Best VDL: 0.81% (RWS Meisterkugeln).



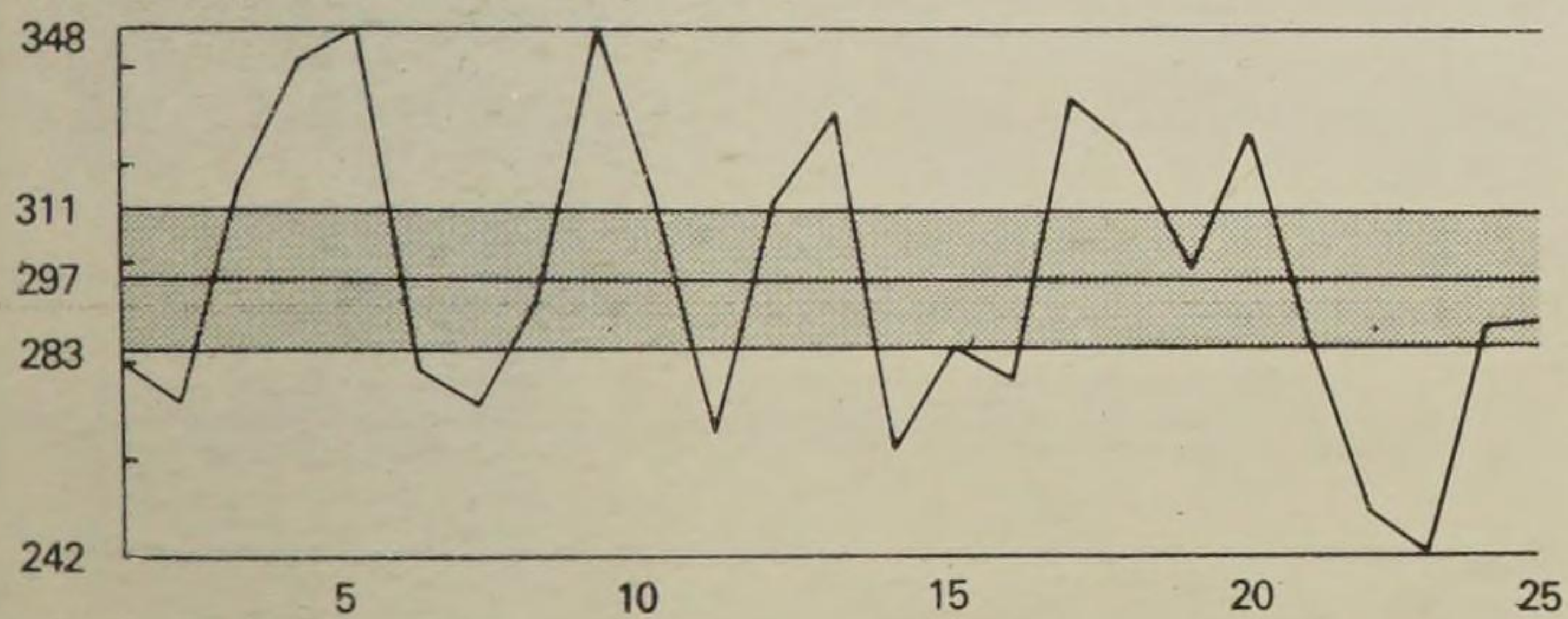
Daisy Powerline 722 (5.5mm/0.22in) Bimoco Neue Spitz: VDL 1.70%, GD 15. Best VDL: 0.85% (RWS Diabolo, Bimoco Diabolo)



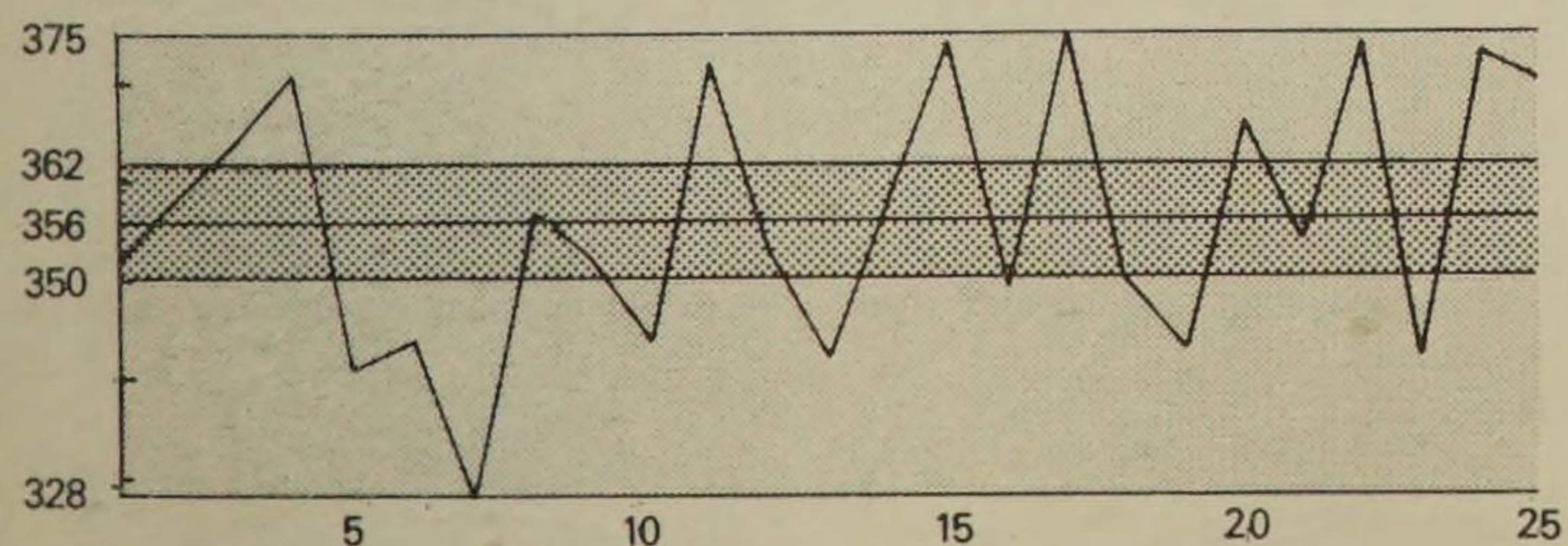
Daisy Powerline 922 (5.5mm/0.22in) RWS Diabolo, 8 pumps: VDL 1.21% GD 18.



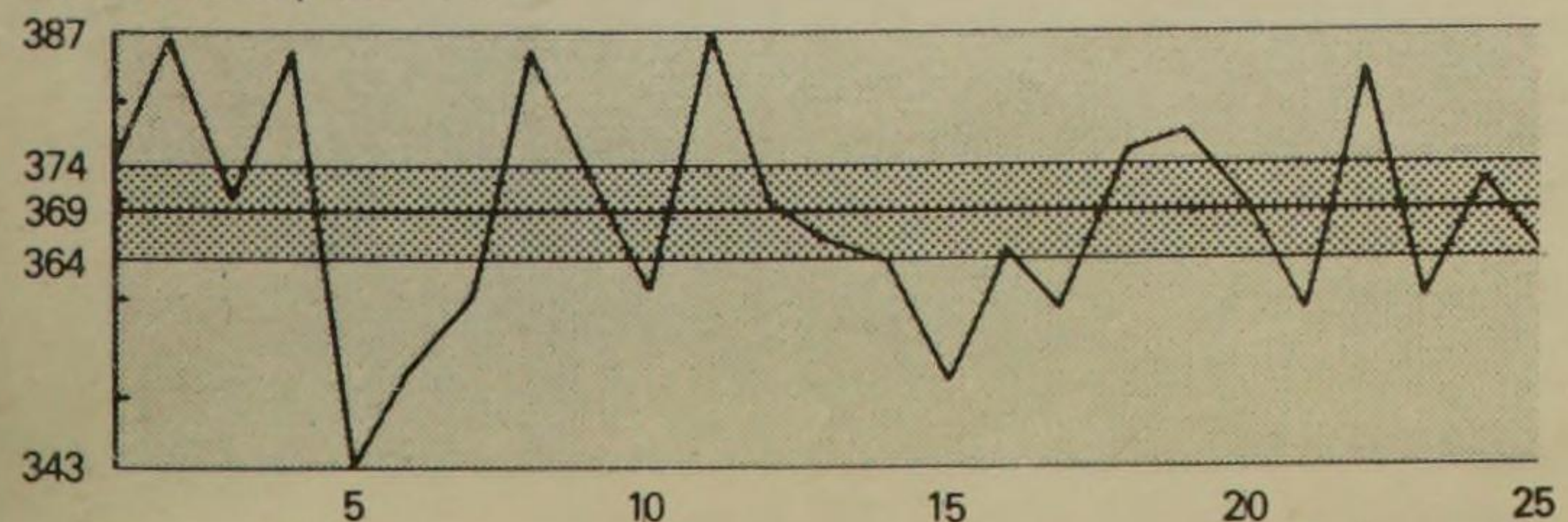
Daisy 1894 'Spittin' Image' (BB) RWS Punktkugel Nr. 9: VDL 9.36%, GD 69. Note: better results with Daisy BB shot, but figures not recorded.



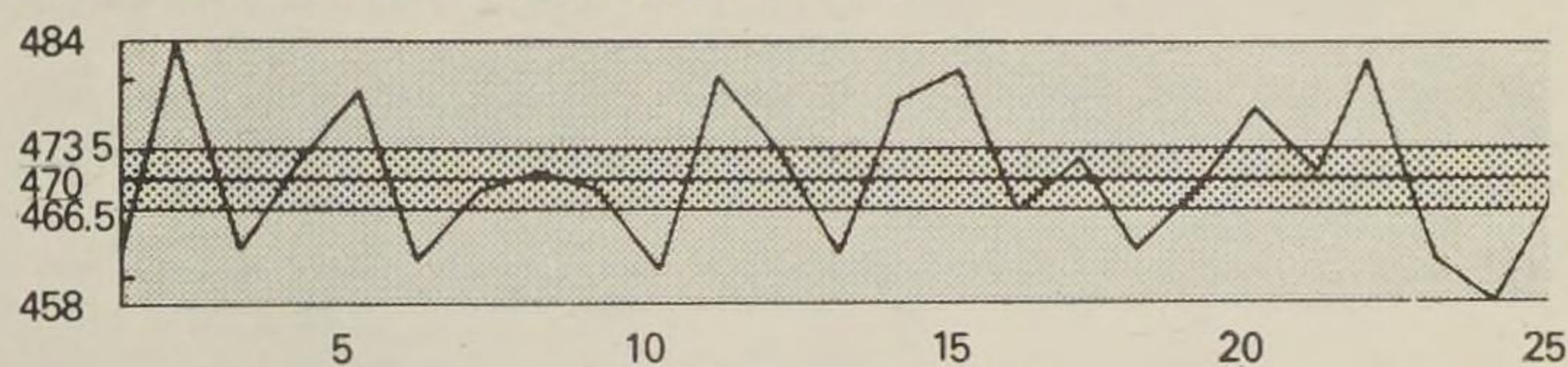
Gun Toys R072 (4.5mm/0.177in) Eley Wasp: VDL 3.37%, GD 32.



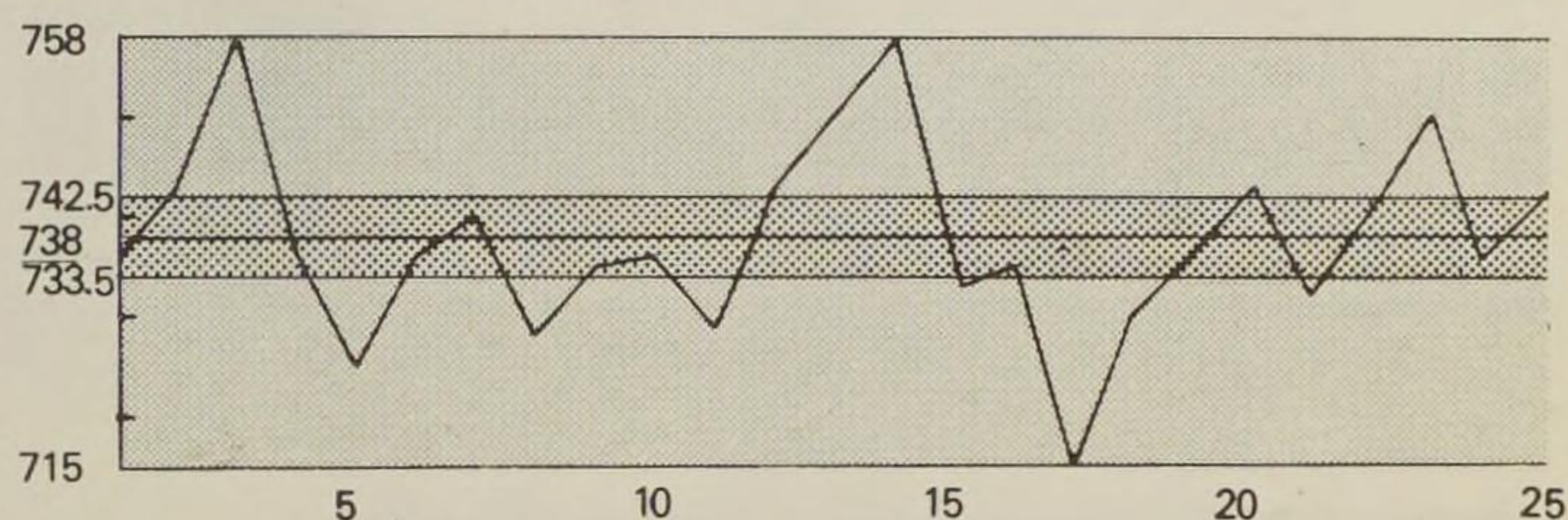
Manufrance Pistolet (5.5mm/0.22in) Champion Standard: VDL 2.85%, GD 42.



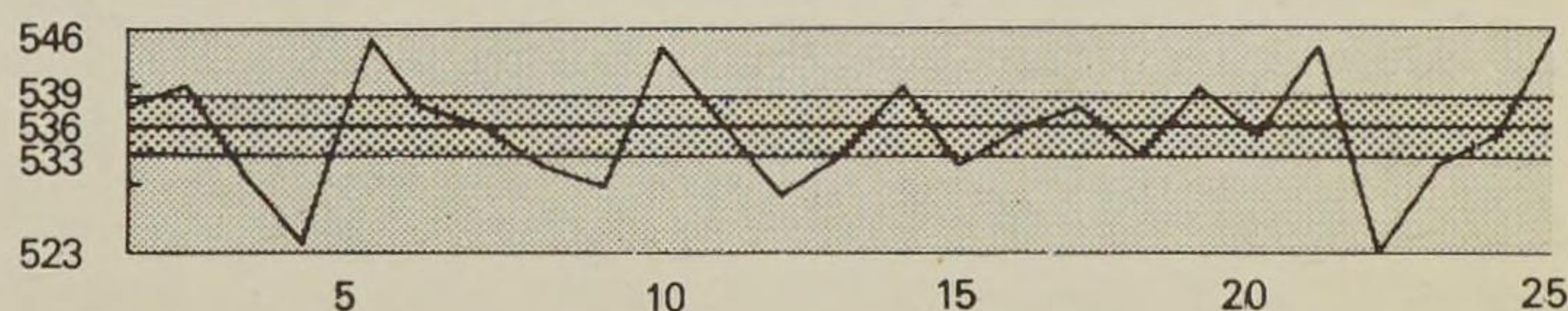
Mayer & Grammelspacher Original Diana LG25D (4.5mm/0.177in) RWS Diabolo: VDL 1.44%, GD 21. Best VDL: 0.71% (RWS Diabolo, seated).



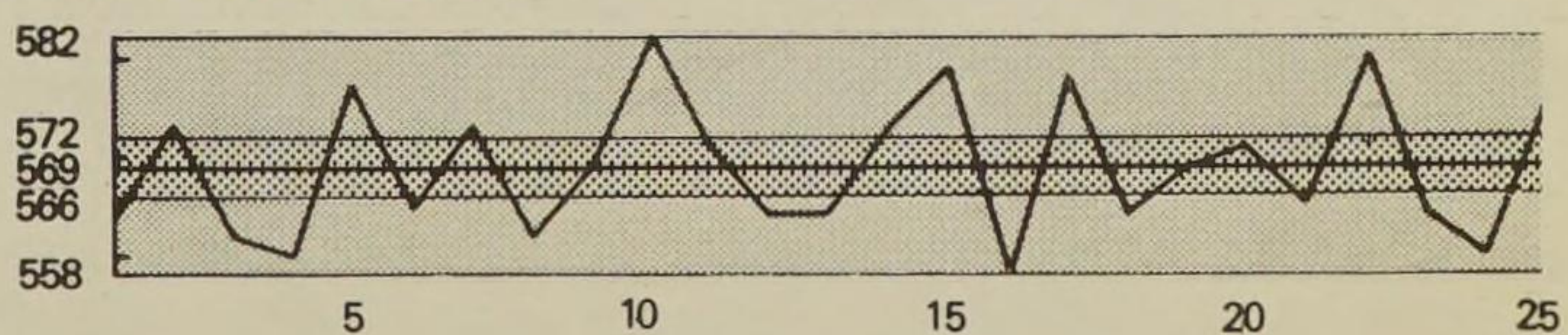
Mayer & Grammelspacher Original Diana LG35S (4.5mm/0.177in) RWS Hobby: VDL 1.20%, GD 25. Best VDL: 0.72% (H&N Match, seated).



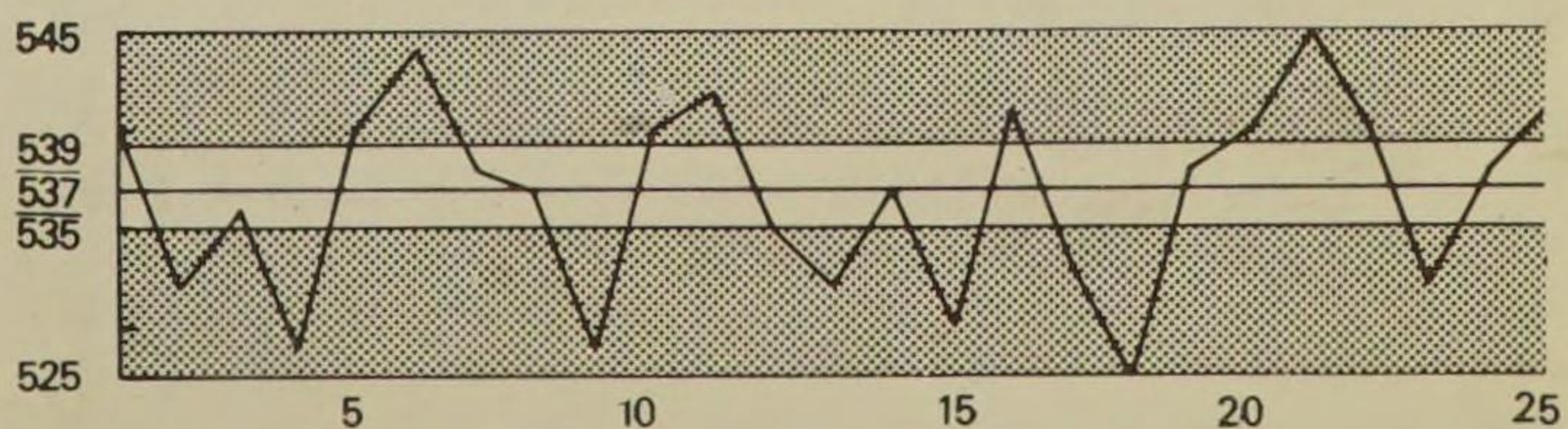
Mayer & Grammelspacher Original Diana LG35S (5.5mm/0.22in) H&N Match: VDL 1.02% GD 21. Best VDL: 0.93% (RWS Diabolo).



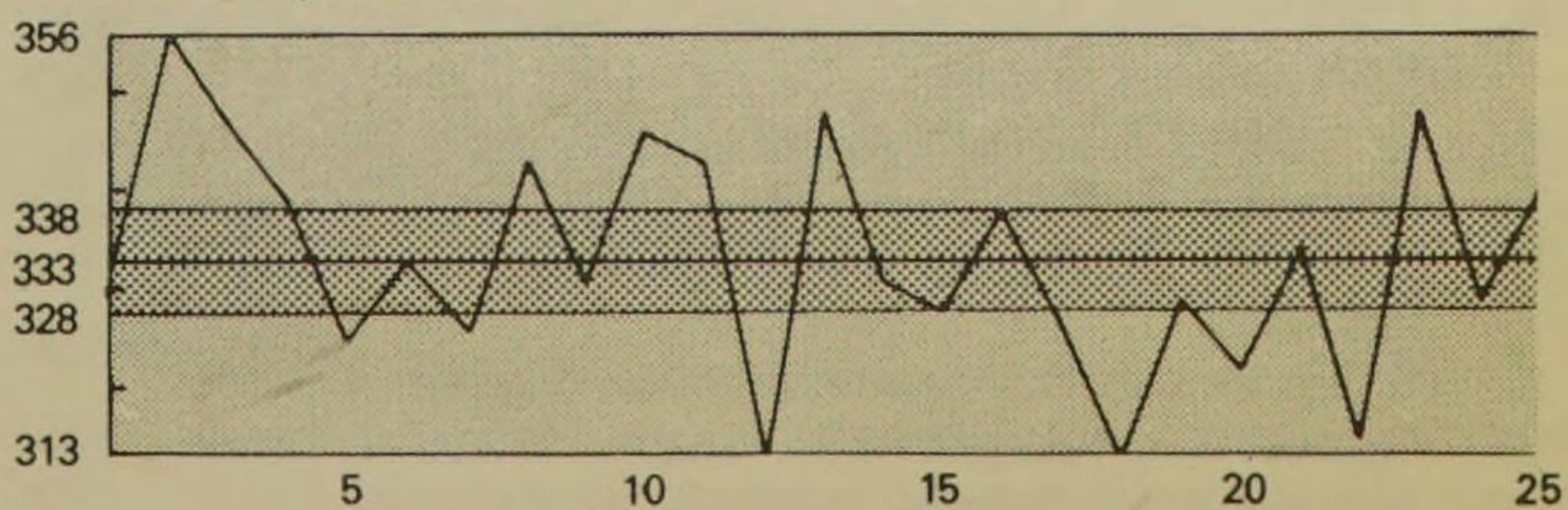
Mayer & Grammelspacher Original Diana LG45 (5.5mm/0.22in) Eley Wasp: VDL 1.12%, GD 21. Best VDL: 0.90% (H&N Match).



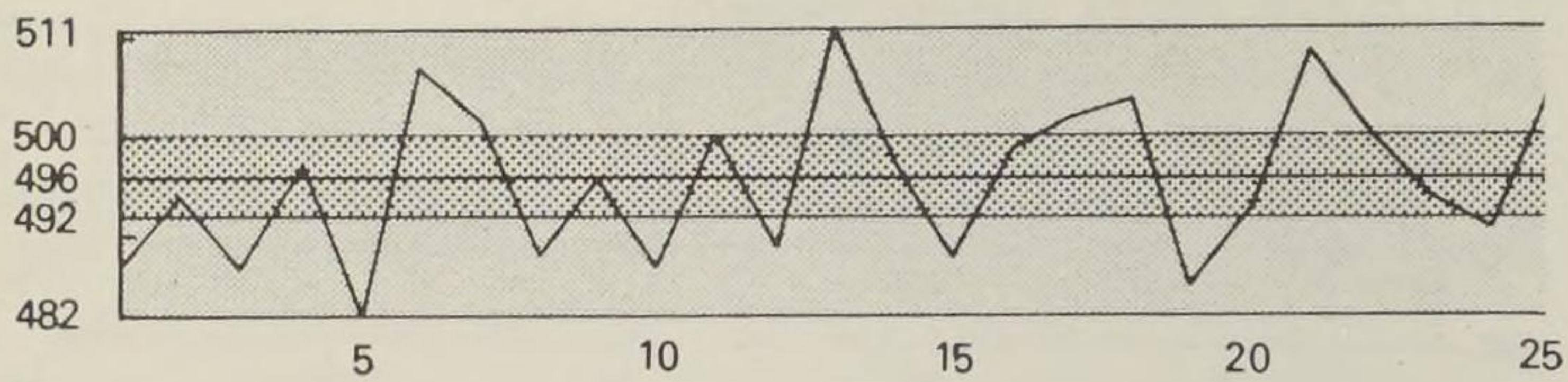
Mayer & Grammelspacher Original Diana LG66 (4.5mm/0.177in) Stiga Match: VDL 0.87%, GD 13. Best VDL: 0.40% (H&N Match, seated).



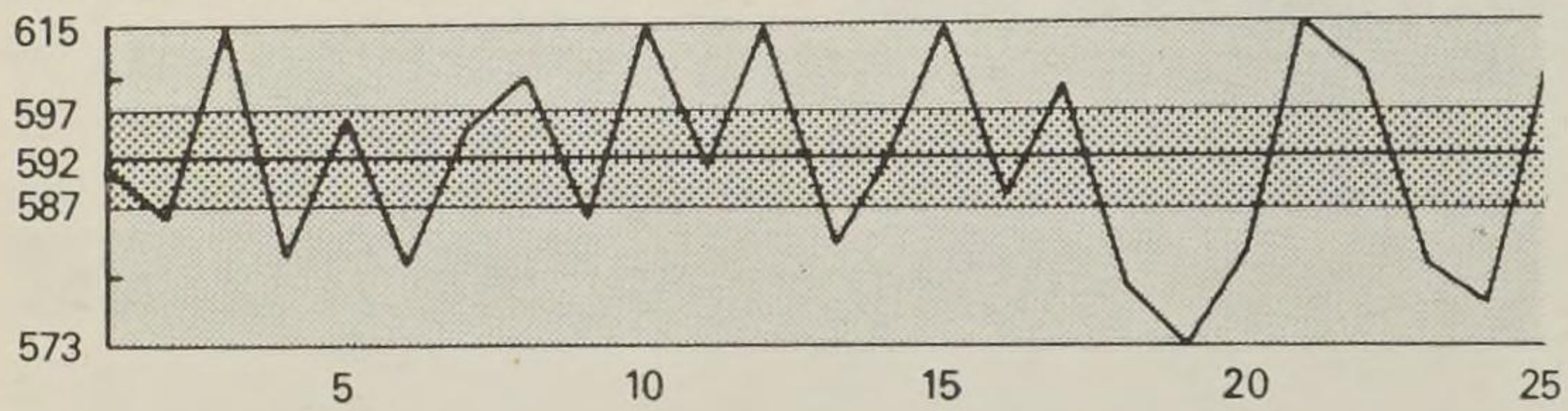
Milbro Diana Cougar G5/2 (5.5mm/0.22in) RWS Diabolo: VDL 3.13%, GD 35.



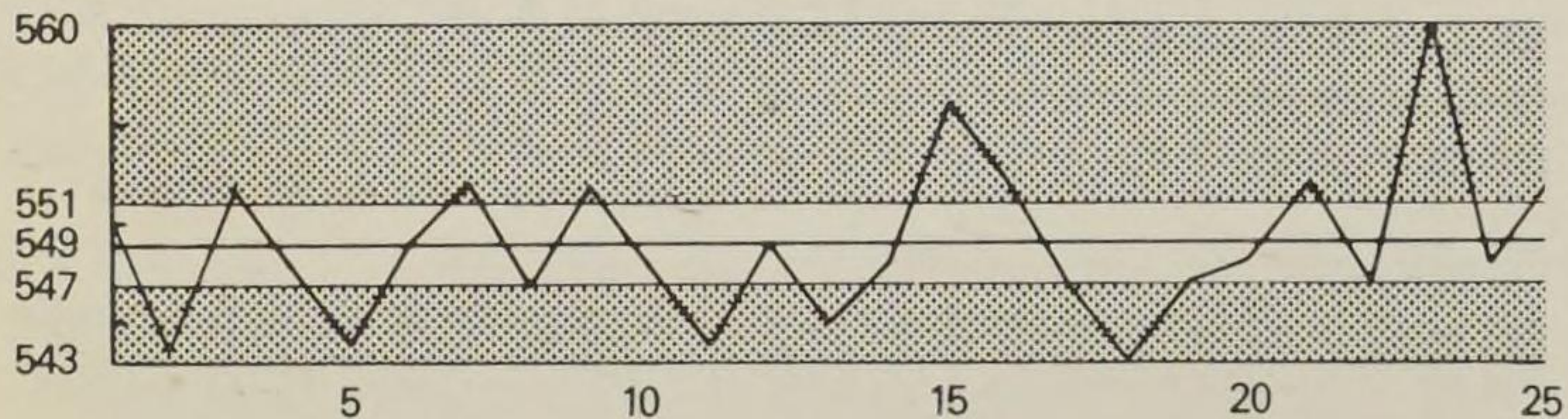
Milbro Diana G80/2 (5.5mm/0.177in) Eley Wasp: VDL 1.47%, GD 25. Best VDL: 1.27% (RWS Diabolo, seated).



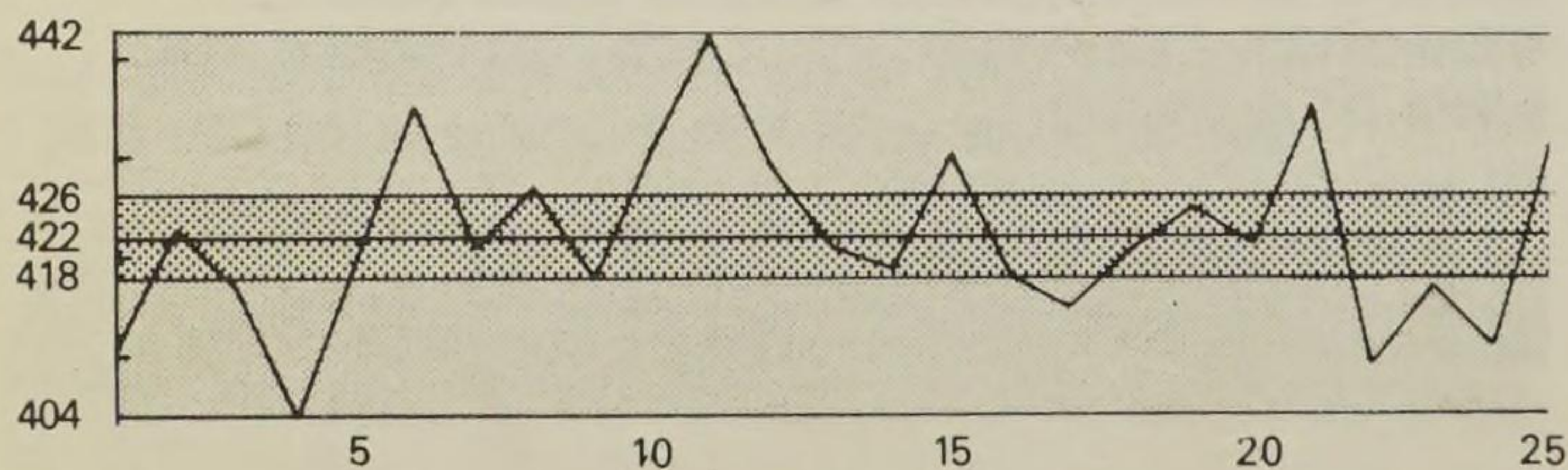
Sussex Armoury Jackal Hi-Power (5.5mm/0.22in) Jackal Pointed: VDL 1.78%, GD 29. Best VDL: 0.80% (H&N Match).



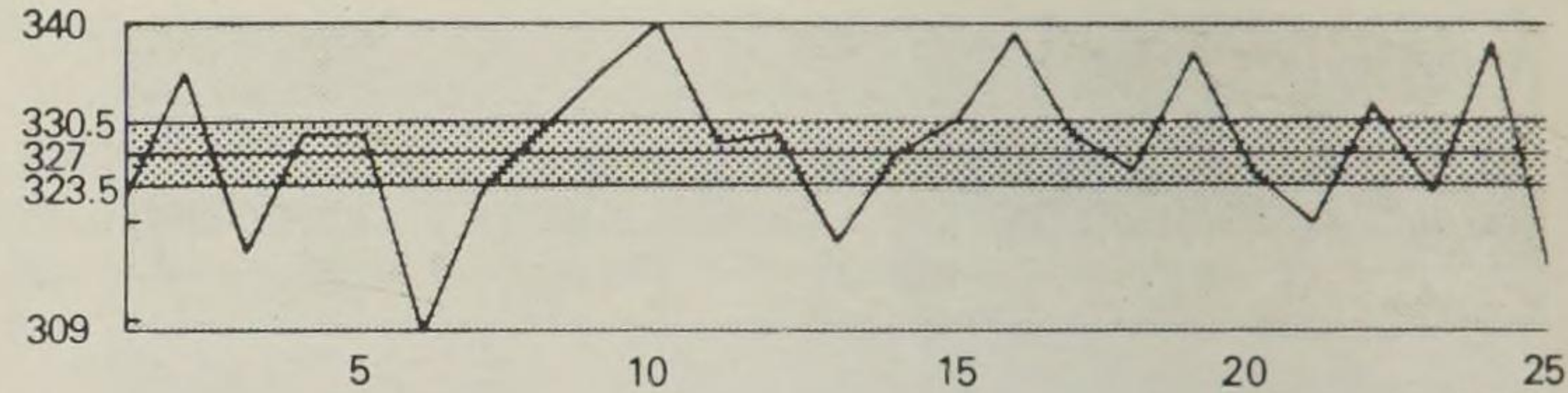
Webley Osprey Supertarget (4.5mm/0.177in) RWS Meisterkugeln: VDL 0.66%, GD 13.



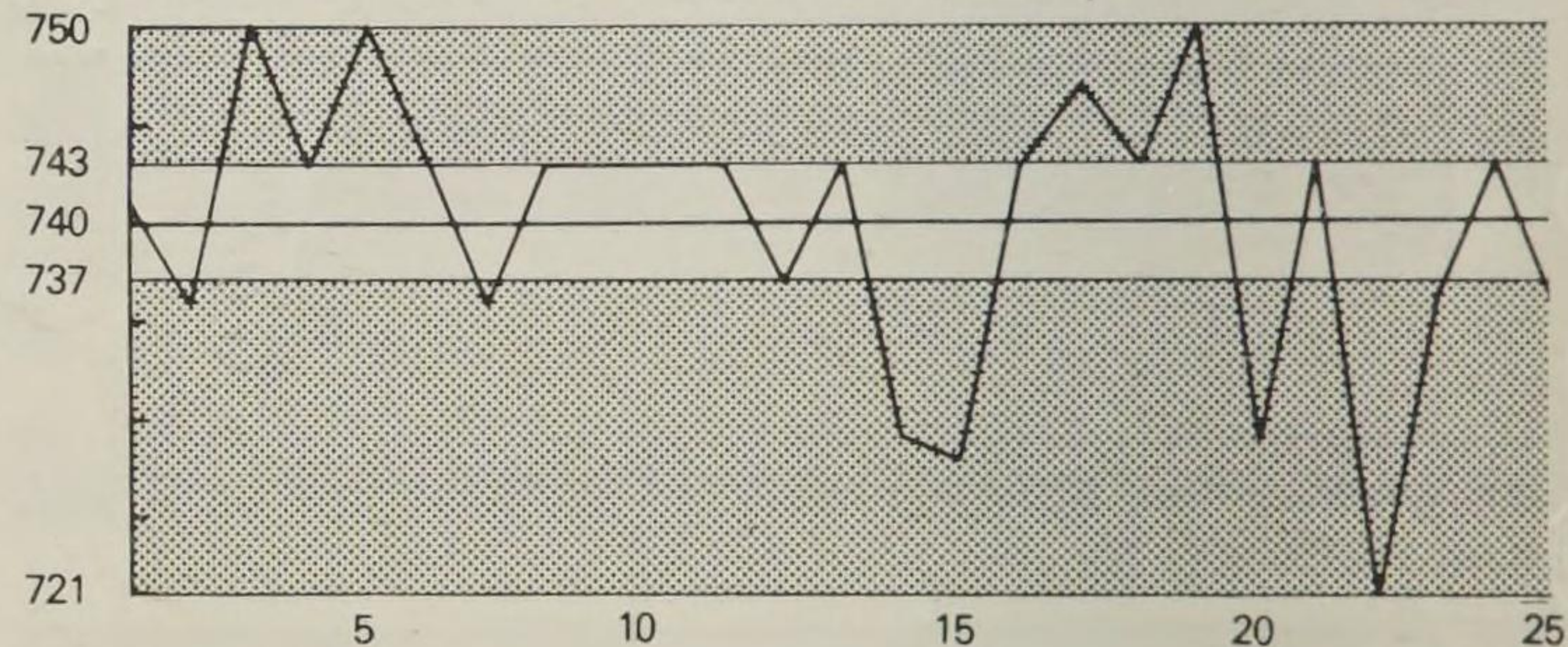
Webley Tempest (4.5mm/0.177in) Caledonian: VDL 2.03%, GD 26.



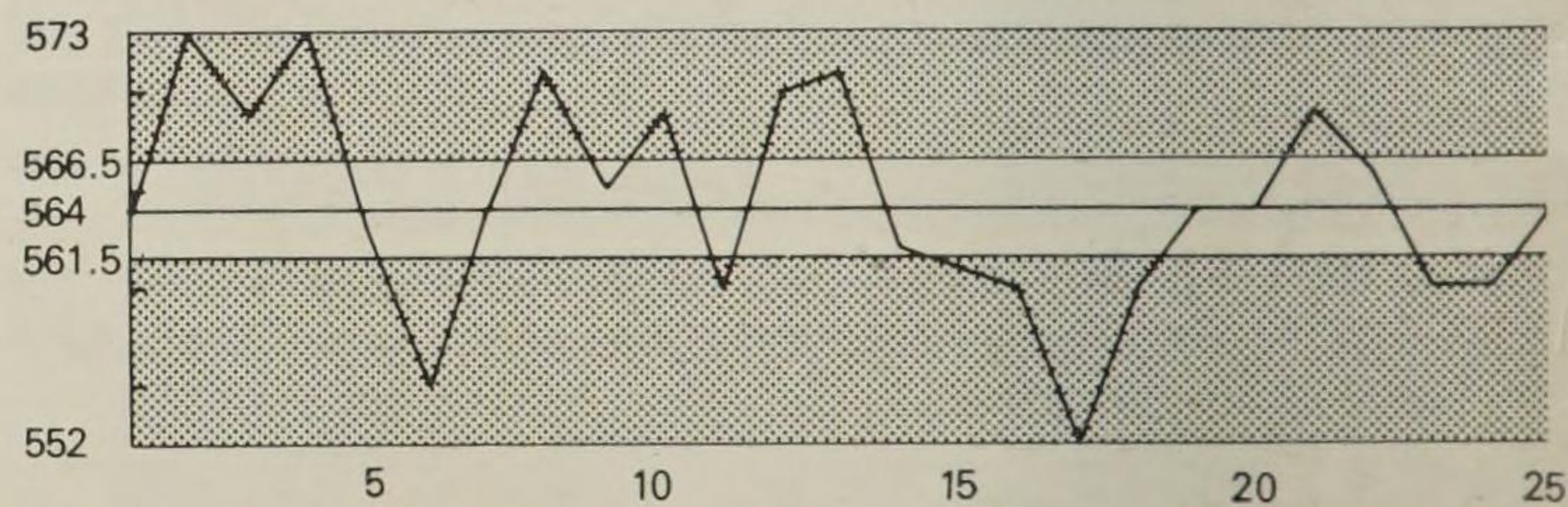
Webley Tempest (5.5mm/0.22in) RWS Diabolo: VDL 2.18%, GD 23.



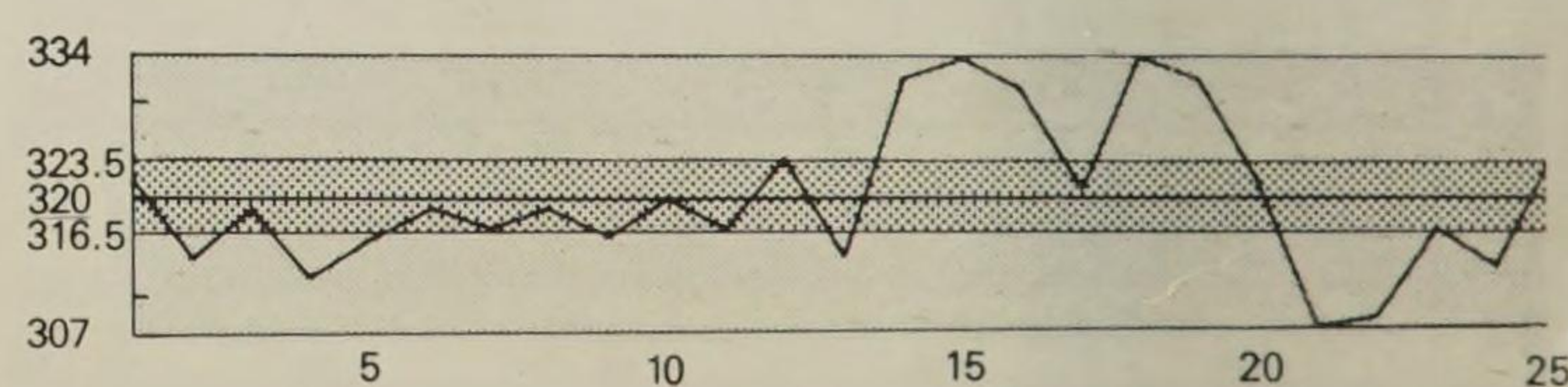
Webley Vulcan (4.5mm/0.177in) RWS Superpoint: VDL 0.91%, GD 22. Best VDL: 0.70% (Eley Match).



Weihrauch HW55T (4.5mm/0.177in) H&N Match: VDL 0.87%, GD 10. Best VDL: 0.74% (H&N Match, seated).



Weihrauch HW70 (4.5mm/0.177in) H&N Match: VDL 2.19%, GD 18.



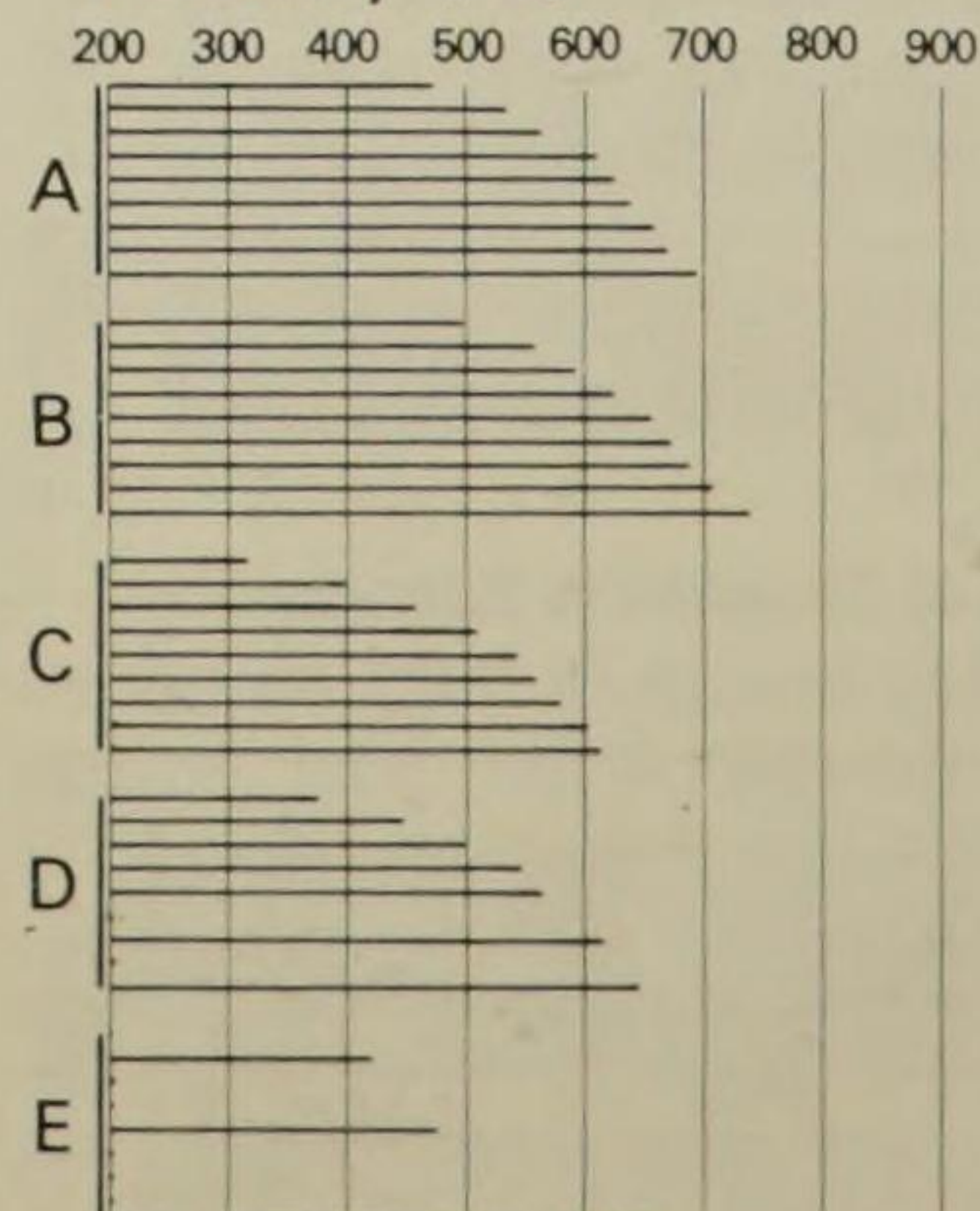
APPENDIX 2. PERFORMANCE OF TYPICAL MULTI-STROKE PNEUMATICS

Benjamin and Crosman guns were lent by the Sussex Armoury, the Daisy by Millard Brothers; pellets were supplied by Eley, Leslie Hewett Ltd, Norman May & Co. and Millard Bros.

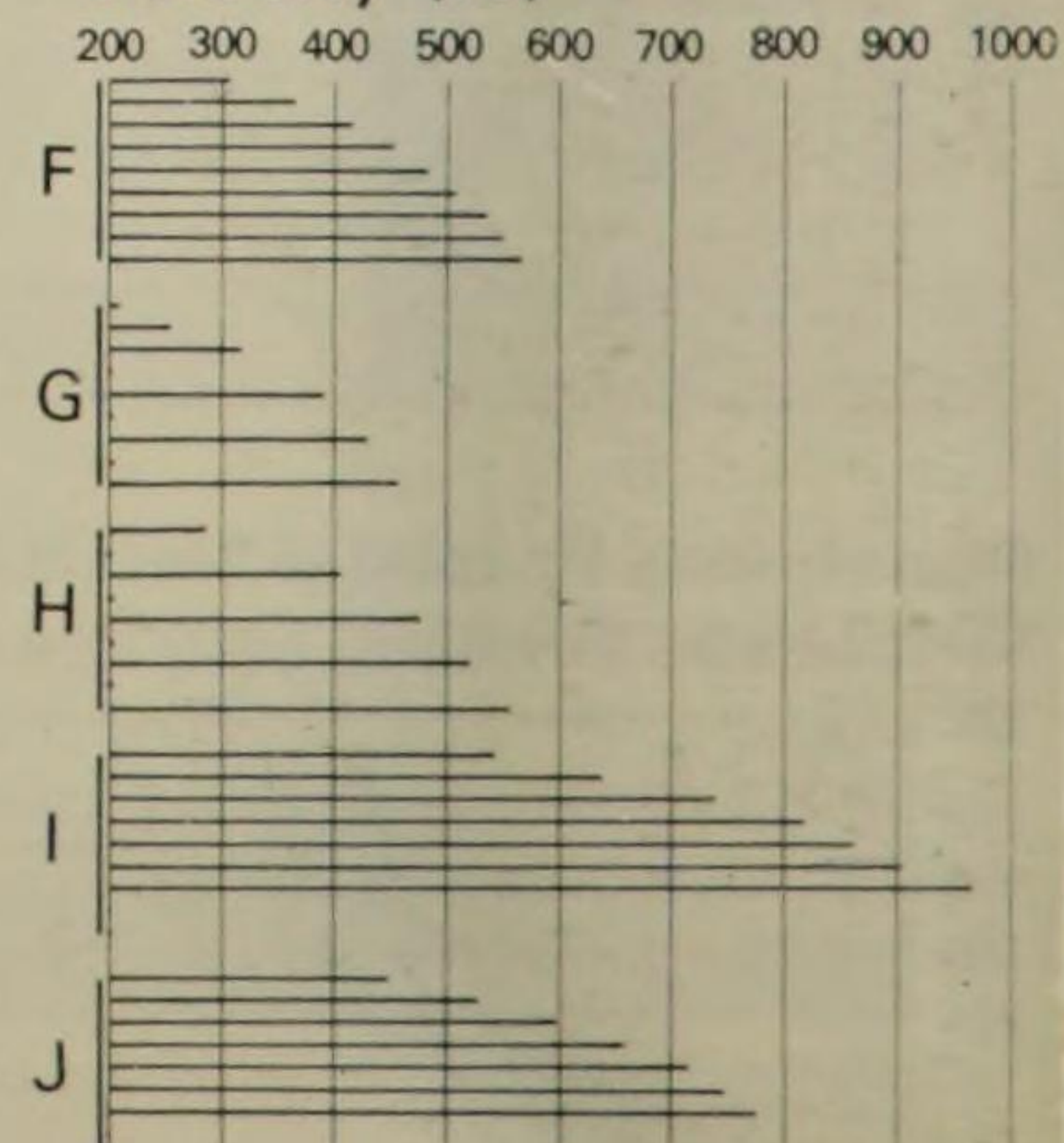
Key:

- A. Benjamin 347, 4.5mm, Eley Match pellets.
- B. Benjamin 347, 4.5mm, RWS Diabolo.
- C. Crosman 760, 4.5mm smoothbore, Bimoco Diabolo.
- D. Crosman 766 American Classic, 4.5mm, RWS Diabolo.
- E. Crosman 766 American Classic, 4.5mm Crosman Super-Pell: maker's figures.
- F. Crosman 2200 Magnum, 5.5mm, Bimoco Diabolo.
- G. Daisy 922 Powerline, 5.5mm, Milbro Caledonian.
- H. Daisy 922 Powerline, 5.5mm, Daisy pellets: maker's figures.
- I. Sharp Innova (full-power version), 4.5mm: maker's figures.
- J. Sharp Innova, 5.5mm: maker's figures.

Velocity (fs)



Velocity (fs)



Note. The Sharp Innova works on a maximum of eight pumps and cannot exceed this number.

APPENDIX 3. PELLET SEATING TRIALS

1. Test using BSA Mercury Mk 3, Original Diana 35S, Original Diana 66 and Weihrauch HW55T

Each series comprised 25 shots, individually seated with a variable-depth pusher.

Gun, pellets	Seating depth (in)	Velocity (fs)			Standard deviation (fs)	VDL (%)
		average	max	min		
BSA Mercury Mk 3, RWS Meisterkugeln	0	712	721	699	6.15	0.81
	0.04	711	721	695	6.05	0.79
	0.08	705	716	695	5.74	0.76
	0.11	693	708	682	6.92	0.93
	0.20	678	688	665	5.56	0.77
Original Diana 35S, H&N Match	0	680	688	668	5.77	0.79
	0.04	712	722	699	7.08	0.93
	0.8	707	715	695	5.50	0.72
	0.11	707	717	696	6.00	0.79
	0.20	682	708	653	12.72	1.74
Original Diana 66, H&N Match	0	530	542	518	5.35	0.94
	0.04	584	601	556	9.75	1.56
	0.08	588	591	582	2.51	0.40
	0.11	547	573	529	11.25	1.92
	0.20	536	549	507	9.76	1.70
Weihrauch HW55T H&N Match	0	564	573	552	5.26	0.87
	0.04	543	552	535	4.32	0.74
	0.08	541	548	529	4.29	0.74
	0.20	541	550	532	5.68	0.98

It is clearly impossible to draw any final conclusions about the merits of pellet seating on the basis of the above figures. There is, for example, a marked advantage where the Original Diana 66 is concerned, but much less effect in the case of the BSA Mercury Mk 3. Why should there be such variation? Firstly, the bore diameters of even these four guns vary considerably: the Mercury was measured as 0.175in, the Original Diana 35S and 66 as 0.174 and 0.173in respectively and the HW55T as 0.170in. The effect of the differing bore sizes was apparent on examining fired pellets, as the contact or friction-generating areas are very distinctive. The four guns were chosen deliberately. The Mercury had a large bore, and the Original Diana 35S and the Weihrauch 55T had obvious loading problems on account of their breech designs. The Original Diana 66, intended as the control gun, rather unexpectedly showed the greatest benefit from pellet seating.

BSA Mercury

This gun showed the least variation in results, with no important change in average velocity or velocity maintenance until a seat of 0.11in (3mm) had been reached. The pellets enter the breech easily owing to its large diameter and the virtual absence of a chamfer, and the presence of a gradual constriction leading into the rifling results in no appreciable difference between performance at the zero and 0.04in (1mm) seating. At 0.11 (3mm), pellets may seat improperly on the junction between the constriction and the bore proper; 0.08in (2mm) or 0.20in (5mm) – either side of the joint – appeared to give the best results, but the marginal improvement makes it dangerous to draw conclusions. There was clearly a velocity loss after 0.1in (2.5mm), after the pellet had engraved properly in the rifling, but it is moot whether this arises from lowered compression ratio or simply the decreased frictional resistance preventing the gun from using its power to the full.

Original Diana 35S

The breech of this gun has a short chamfer, but its face is angled in relation to the bore axis, necessitating care to seat the base of

the pellet rather than the top. A seat of 0.8–0.11in (2–3mm) clears the lower edge of the chamfer and provides an extra 30fs muzzle velocity, owing, one assumes, to a better balance between frictional resistance and propulsive effort. The gun functions more efficiently until something less than 0.20in (5mm) seating is exceeded, whereupon the effects are reversed and the gun apparently fails to develop its full working pressure.

Original Diana 66

This has a longer chamfer to the chamber than the 35S, and a breech face squared to the bore axis. The deterioration of performance at 0.04in (1mm) – despite the 50fs gain in velocity – arises from seating the pellet on rather than ahead of the chamfer-edge. A vast improvement in consistency is evident at 0.08in (2mm), when the pellet lies ahead of the chamfer, but performance deteriorates thereafter as the lowered compression ratio and reduced frictional resistance to pellet engraving prevent the gun attaining full power.

Weihrauch HW55T

The notably 'tight' bore of the Weihrauch made seating the pellet with the thumb virtually impossible, and the occasional wild shot was encountered during offhand shooting. This normally struck 1.2–2.0in (3–5cm) below the remainder of ten-shot groups at 10m, having emerged at low velocity. The HW55T has a very short breech chamfer, and pellets need only be seated to 0.02–0.04in (0.5–1mm). Optimum performance is obtained up to about 0.14–0.16in (3.5–4mm), after which the gun seemingly fails to generate full power. Though consistency of accuracy and velocity improves fairly quickly as each shot has been individually sized to the bore – eliminating the 'flyers' caused by pellets caught on the air cylinder as the breech closes – velocity is reduced by 20fs with only minimal seating owing to the decreased compression ratio.

Conclusion

The overall results appear contradictory and any final conclusion, therefore, is worthless. It seems possible that many

guns with chamfered chamber-edges may benefit from pellet seating – to a degree dependent on pellet diameter and rifling type – and that optimum performance (not necessarily maximum velocity) occurs when pellets are seated a short distance ahead of the chamfering. Unfortunately, the only

reasonable solution is for each owner to undertake his own experiments, as seating will degrade the performance of some pellets that seat largely on their heads rather than their skirts. However, such experimentation would obviously be difficult without access to a suitable chronograph or ballistic pendulum.

2. Test with Original Diana LG66, 4.5mm/0.177in, using a variety of pellets

Tests: each 25-shot strings, seated where necessary to a depth of 0.08in (2mm). All figures obtained with the Skan Chronoscope.

Pellet	Seated		Unseated		Difference + / - %	
	V _x (fs)	VDL (%)	V _x (fs)	VDL (%)	V _x (fs)	VDL
Bimoco Diabolo	552	0.68	558	0.85	- 1	+ 20
Bimoco Elite	565	1.40	582	1.03	- 3	- 36
Bimoco Neue Spitz	557	0.99	593	1.32	- 6	+ 25
Bimoco Silver Streak	506	0.96	540	1.09	- 6	+ 12
Milbro Caledonian	557	0.65	541	0.97	+ 3	+ 33
Eley Match	571	0.61	546	1.00	+ 5	+ 39
Eley Wasp	573	0.78	552	1.37	+ 4	+ 43
H&N Match	582	0.45	531	0.94	+ 10	+ 52
H&N Pointed	530	1.86	509	1.82	+ 4	- 2
RWS Diabolo	603	0.69	551	1.18	+ 9	+ 42
RWS Hobby	604	1.06	548	2.41	+ 10	+ 56
RWS Meisterkugeln	554	0.57	540	0.93	+ 3	+ 39
RWS Superpoint	566	1.39	546	1.08	+ 4	- 29
Silver Jet	501	1.89	515	1.14	- 3	- 66
Stiga Match	553	0.59	537	0.87	+ 3	+ 32
Sussex Armoury Jackal	554	1.80	471	21.5	+ 18	+ 92
Sussex Armoury Standard	507	2.26	511	1.05	- 1	- 115
Webley	549	1.15	502	1.37	+ 9	+ 16
Zero	545	1.47	524	1.29	+ 4	- 14
Z&S Diabolo	602	0.87	567	1.29	+ 6	+ 33
Overall changes (average)					+ 3	+ 14

The improvement depends largely on the pellet design; several have broad bearing surfaces on their heads, generating more friction and hence greater resistance to engraving in the rifling. Seating them appears to lessen pressure build-up and therefore reduce velocity. The spectacularly poor showing of

the unseated Jackal Pointed arose from air-leak around the small-diameter head and skirt, which was minimized when manually seated. The new Parker-Hale Sizerpac device facilitates 'sizing' individual pellets before firing – leading to increased velocity, greater consistency and better accuracy.

APPENDIX 4. DEFECTIVE PELLET TRIAL

Gun: Original Diana LG66, 4.5mm/0.177in.

Pellets: Eley Match, supplied by the manufacturer, were used throughout. The results were obtained with the Skan Chronoscope.

Damage	Velocity (fs)			VDL %	Typical group (in) ctc
	average	max	min		
Head crushed, skirt undamaged	527	540	505	1.49	0.49
Skirt crushed, head undamaged	499	525	482	2.18	0.62
Head and skirt crushed in the same plane	500	533	458	3.87	0.98
Head and skirt crushed at 90° to each other	489	513	460	2.90	0.70
Pellet-base angled at 15° to bore axis	522	532	504	1.07	0.51
Small notch, simulating a thumb-nail nick, cut in the pellet-skirt	535	548	520	1.20	0.47
Control, unseated	546	555	531	0.97	0.39*
Control, seated to 2mm	570	577	564	0.61	0.27
Backward-pellet test	513	544	467	4.05	1.37

*Averages of five 5-shot groups

This experiment indicates that care should be taken to sort out damaged pellets, especially those that are badly crushed. There is a significant difference between the performance of an undamaged pellet and one that is defective, and for either

sporting or target-shooting purposes, such disparity could be crucial. (Please note that the pellets were specially damaged for the purpose of our trial and were not defective pellets supplied by the manufacturer.)

APPENDIX 5: AIRGUN CATEGORIES

The class system used here is intended to provide a reasonably simple means of comparing the types of gun available, and gives positive guidance regarding what the purchaser may expect from each. Used in conjunction with the Comparachart, the information contained here should help a prospective gun-buyer make his choice.

TARGET GUNS

M1 Rifles/C1 Pistols

The criteria for top-class guns include the possession of:

- i Very good design.
- ii Very good construction, workmanship and finish.
- iii An absence of recoil.
- iv Automatic safety device(s).
- v Fully micro-adjustable aperture sights.
- vi A fully adjustable trigger system.
- vii A competition-style stock or grip.
- viii A fixed barrel and suitable technical refinements.
- ix Very good accuracy.
- x Very consistent performance.

M2 Rifles/C2 Pistols

These are specialized non-recoilless designs, in which weight and low-power springs are usually used to damp out recoil and spring-surge sensations, though the guns lack some of the refinement of the previous group. As M1/C1, except:

- iii Minimal recoil.
- viii A positively-locked barrel, if a break-barrel type.

M3 Rifles/C3 Pistols

These are mostly non-specialized target airguns, similar to standard or dual-purpose/sporting types. They should have:

- i Very good or good design.
- ii Very good or good construction, workmanship and finish.
- iii Slightly less recoil than normal.
- iv Automatic safety device(s).
- v Fully adjustable sights.
- vi A trigger adjustable for at least pull-weight and let-off point.
- vii A well shaped stock or grip, not necessarily adapted for competition use.
- viii A positive barrel-lock, if possible.
- ix Good to very good accuracy.
- x Good to very good consistency.

SPORTING/DUAL-PURPOSE GUNS

This power-based system also indicates

lessening quality; however, considerable differences in design and construction are to be expected.

R1 Rifles/P1 Pistols

Very powerful designs, developing muzzle energy in excess of 15.5J (11.4fp) for rifles and 6.5J (4.8fp) for pistols.

Features should include:

- i Good or very good design.
- ii Good or very good construction, workmanship and finish.
- iii Automatic or semi-automatic safety device(s).
- iv Sturdy fully-adjustable back sights, with a durable front sight (which may be hooded).
- v A trigger adjustable for pull-weight and let-off.
- vi A well designed pistol-grip stock, with a cheekpiece, or thumb-rest grips in the case of the pistols.
- vii Some degree of technical refinement.
- viii A positive barrel-lock, if a break-barrel design.
- ix Telescope sight mounts.
- x Very good accuracy.
- xi Very good consistency.

R2 Rifles/P2 Pistols

These high-power designs develop between 12 and 15.5J (8.7–11.4fp) for rifles, and 5–6.5J (3.7–4.8fp) for pistols. All features are as for R1/P1 except:

- viii An efficient barrel-lock, which may only be a spring-loaded detent.
- x Good accuracy.
- xi Good consistency.

R3 Rifles/P3 Pistols

This group of medium-power guns, encompassing the majority of the available designs, contains a wide variety of features and construction. The power limits have been set at 8.5–12J (6.3–8.7fp) for rifles and 3.5–5J (2.6–3.7fp) for pistols. Criteria are:

- i Average to good design.
- ii Average to good construction, finish and workmanship.
- iii Automatic, semi-automatic or manual safety device(s).
- iv Fully adjustable open sights.
- v A trigger capable of some adjustment.
- vi Good stock or grip design, with a pistol grip and cheekpiece if a rifle, or a thumb-rest if a pistol.
- vii Supported or guided mainspring(s) with central-rod release, or comparable refinement.
- viii A detent-locked barrel.
- ix Telescope sight mounts.
- x Average to good accuracy.

- xi Average to good consistency.

R4 Rifles/P4 Pistols

Low-power types generating a muzzle energy of only 5–8.5J (3.7–6.3fp) for rifles and 2–3.5J (1.5–2.6fp) for pistols.

All features to parallel R3/P3, except:

- ii Average construction, finish and workmanship.
- iv Sights capable of some adjustment, usually elevation only.
- vi Good stock with a pistol grip, or a good grip with some kind of thumb-rest.
- x Average accuracy.
- xi Average consistency.

R5 Rifles/P5 Pistols

These guns develop minimal power and also generally lack all but the rudiments of sophistication, the exceptions usually being US BB guns such as the Daisy 840, the Milbro G85/1 Bob Cat and a few others. The power limits are below 5J (3.7fp) for rifles and less than 2J (1.5fp) for pistols. Their features should include:

- i Average manufacture.
- ii An adequate stock, with a fore-end, or an acceptable grip.
- iii A detent-locked barrel, or similar.
- iv Some kind of safety feature.
- v Acceptable accuracy for the class.

APPENDIX 6: POWER GROUP TABLES

METRIC MEASURE

Velocity ranges to the nearest whole metre-second

Gun class	R5/P5	R4/P4	R3/P3	R2/P2	R1/P1
Pellet wt (gr)	<5J	5 – 8.5J	8.5 – 12J	12 – 15.5J	>15.5J

Rifles

4.5mm band:

0.425	0 – 153	154 – 200	201 – 238	239 – 270	271 +
0.450	0 – 149	150 – 194	195 – 231	232 – 262	263 +
0.475	0 – 145	146 – 189	190 – 225	226 – 255	256 +
0.500	0 – 141	142 – 184	185 – 219	220 – 249	250 +
0.525	0 – 138	139 – 180	181 – 214	215 – 243	244 +
0.550	0 – 135	136 – 176	177 – 209	210 – 237	238 +

5.6mm band:

0.800	0 – 112	113 – 146	147 – 173	174 – 197	198 +
0.825	0 – 110	111 – 144	145 – 171	172 – 194	195 +
0.850	0 – 108	109 – 141	142 – 168	169 – 191	192 +
0.875	0 – 107	108 – 139	140 – 166	167 – 188	189 +
0.900	0 – 105	106 – 137	138 – 163	164 – 186	187 +
0.925	0 – 104	105 – 136	137 – 161	162 – 183	184 +
0.950	0 – 103	104 – 134	135 – 160	161 – 181	182 +
0.975	0 – 101	102 – 132	133 – 157	158 – 178	179 +

Pistols

4.5mm band: <2J

0.425	0 – 97	98 – 128	129 – 153	154 – 175	176 +
0.450	0 – 94	95 – 125	126 – 149	150 – 170	171 +
0.475	0 – 92	93 – 121	122 – 145	146 – 165	166 +
0.500	0 – 89	90 – 118	119 – 141	142 – 161	162 +
0.525	0 – 87	88 – 115	116 – 138	139 – 157	158 +
0.550	0 – 85	86 – 113	114 – 135	136 – 154	155 +

5.6mm band:

0.800	0 – 71	72 – 94	95 – 112	113 – 127	128 +
0.825	0 – 70	71 – 92	93 – 110	111 – 126	127 +
0.850	0 – 69	70 – 91	92 – 108	109 – 124	125 +
0.875	0 – 68	69 – 89	90 – 107	108 – 122	123 +
0.900	0 – 67	68 – 88	89 – 105	106 – 120	121 +
0.925	0 – 66	67 – 87	88 – 104	105 – 119	120 +
0.950	0 – 65	66 – 86	87 – 103	104 – 117	118 +
0.975	0 – 64	65 – 85	86 – 101	102 – 115	116 +

IMPERIAL MEASURE

Velocity ranges (to the nearest whole fs)

Gun class	R5/P5	R4/P4	R3/P3	R2/P2	R1/P1
Pellet wt (gr)	<3.7fp	3.7 – 6.3fp	6.3 – 8.7fp	8.7 – 11.4fp	>11.4fp

Rifles

0.177in band:

6.5	0 – 506	507 – 661	662 – 781	782 – 888	889 +
7.0	0 – 488	489 – 637	638 – 752	753 – 856	857 +
7.5	0 – 471	472 – 615	616 – 727	728 – 827	828 +
8.0	0 – 456	457 – 595	596 – 704	705 – 801	802 +
8.5	0 – 443	444 – 578	579 – 683	684 – 777	778 +

0.22in band:

12.0	0 – 373	374 – 486	487 – 575	576 – 654	655 +
12.5	0 – 365	366 – 476	477 – 563	564 – 641	642 +
13.0	0 – 358	359 – 467	468 – 552	553 – 628	629 +
13.5	0 – 351	352 – 458	459 – 542	543 – 617	618 +
14.0	0 – 345	346 – 450	451 – 532	533 – 605	606 +
14.5	0 – 339	340 – 442	443 – 523	524 – 595	596 +
15.0	0 – 333	334 – 435	436 – 514	515 – 585	586 +

Pistols

0.177in band: <1.5fp

6.5	0 – 322	323 – 424	425 – 506	507 – 577	578 +
7.0	0 – 311	312 – 409	410 – 488	489 – 556	557 +
7.5	0 – 300	301 – 395	396 – 471	472 – 537	538 +
8.0	0 – 291	292 – 383	384 – 456	457 – 520	521 +
8.5	0 – 282	283 – 371	372 – 443	444 – 504	505 +

0.22in band:

12.0	0 – 237	238 – 312	313 – 373	374 – 424	425 +
12.5	0 – 232	233 – 306	307 – 365	366 – 416	417 +
13.0	0 – 228	229 – 300	301 – 358	359 – 408	409 +
13.5	0 – 224	225 – 294	295 – 351	352 – 400	401 +
14.0	0 – 220	221 – 289	290 – 345	346 – 393	394 +
14.5	0 – 216	217 – 284	285 – 339	340 – 386	387 +
15.0	0 – 212	213 – 279	280 – 333	334 – 380	381 +

British legal limits for airgun power (16.27J rifles, 8.14J pistols)

Pellet wt (gm)	Actual Velocity (V _a)
Rifles	Pistols

4.5mm band:

0.425	277	196
0.450	269	190
0.475	262	185
0.500	255	180
0.525	249	176
0.550	243	172

5.6mm band:

0.800	202	143
0.825	199	140
0.850	196	138
0.875	193	136
0.900	190	134
0.925	188	133
0.950	185	131
0.975	183	129

British legal limits for airgun power (12fp rifles, 6fp pistols)

Pellet wt (gm)	Actual velocity (V _a)
Rifles	Pistols

0.177in band:

6.5	912	645
7.0	879	621
7.5	849	600
8.0	822	581
8.5	797	564

0.22in band:

12.0	671	474
12.5	657	465
13.0	645	456
13.5	633	447
14.0	621	439
14.5	610	432
15.0	600	424

German legal limits for airgun power (7.5J)

Pellet wt (gm)	V _a	Pellet wt (gm)	V _a
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4.5mm band:

0.425	188	0.800	137
0.450	183	0.825	135
0.475	178	0.850	133
0.500	173	0.875	131
0.525	169	0.900	129
0.550	165	0.925	127

5.6mm band:

0.950	125
0.975	124

Figures given for British and German legal limits are the maximum permitted velocities for the specified pellet weight. The value of g (gravitational acceleration) is assumed to be 32.16fs. The remaining gun classes, M (rifles) and C (pistols), applicable only to target weapons, are not based on power.

Comparachart

It is virtually impossible to list the retail prices of the various airguns, since the vagaries of currency fluctuations and manufacturers' wholesale rates would inevitably make the list several months out of date by the time the book reached the market. Several importers and distributors acquire guns in large quantities only once or twice a year; because of the gaps between shipments, prices may occasionally rise quite steeply and then level off for several months before the next bulk shipment is obtained.

The relative strengths of the economies of the three principal markets in which this book is likely to be circulated – Britain, Germany and the USA – mean that what is relatively cheap in one zone may be less attractively priced in the others, and, consequently, makes general conclusions very dangerous. Of course, a British-made gun is likely to be cheaper on the home market than an import of comparable quality, but the same British gun may compare unfavourably with American rivals when sold in the United States. However, the class-grouping system on which this book is based also provides a very rough guide to price. The more sophisticated the target gun, or the more powerful a sporting rifle, then the higher will be the price in all but a few exceptional cases such as the Original Diana 66 rifle and the Daisy 717/722 pistols – which are all a good deal cheaper than most of their direct rivals.

At the present time, the principal target rifles – the Feinwerkbau series, the Walther LGRs and even the appreciably cheaper Original Diana LG75 – will cost well in excess of £200 (\$475), while the top-line pistols will also lie in this bracket. The lower-grade target rifles, the M2 class, containing items such as the Webley Osprey Supertarget, may be found within the £100–200 range (\$250–500); and the cheapest of the target grades, M3, which contains guns such as the Anschütz LG335S and the Norica 80-G, may be placed in £60–100 (\$150–250). The most expensive of the sporting guns, the R1 and R1/R2 series, may be obtained anywhere for between £60 and £120 (\$150–300), as they rarely have the extreme sophistication of the target guns. At the very bottom of this bracket lie some British guns, such as the BSA Mercury and the Webley Vulcan, which may still be obtained – by judicious shopping around – for below £60. Guns in the R3, R4 and R5 classes are generally commensurately cheaper than those in R1 and R2; many of the lower-powered rifles may be obtained for less than £35–40 (\$85–100), while some of the pistols – somewhat cheaper in all categories – may be seen for as little as £15 (\$35). Some quite advanced pistols in the P3 group, for example, may be obtained for less than £35 (\$85).

KEY

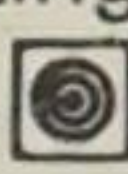
- Generally available.
 - Uncommon or infrequent availability.
 - ® Not available / rarely or never seen.
 - N No longer available.
 - Value for money.
 - ⊙ Design, construction, finish, workmanship.
 - ⊙ Relative simplicity, ease of maintenance and dismantling/reassembly.
 - ⊙ Suitability for target shooting.
 - ⊙ Suitability for sporting use.
 - Suitability for 'plinking' (non-serious target or field shooting); otherwise, these guns would receive only one symbol on the other scales – a misleading guide to their intent and usefulness.
- ¹Only refers to areas outside the country of origin.

Type	Class	Calibre				Rating						Availability		
		BB	.177	.22	other	●	⊙	⊙	⊙	⊙	■	GB	US	Eur ¹

SINGLE-STROKE PNEUMATICS

Sidelever action rifles

Walther LGR	M1	—	■	—	—	5	5	4	5	2	—	●	●	●
Walther LGR Junior	M1	—	■	—	—	5	5	4	5	2	—	●	●	●
Walther LGR Match	M1	—	■	—	—	5	5	4	5	2	—	●	●	●
Walther LGR Match Universal	M1	—	■	—	—	5	5	4	5	2	—	●	●	●
Walther LGR Laufende Scheibe	M1	—	■	—	—	5	5	4	5	4	—	●	●	●

Type	Class	Calibre				Rating						Availability		
		BB	.177	.22	other							GB	US	Eur ¹
Underlever action rifles														
Daisy 840	R5	■	■	—	—	4	3	3	—	—	5	®	●	®
Daisy 845	R5	■	■	—	—	4	3	3	3	1	—	®	●	®
Daisy 850	R5	■	■	—	—	4	3	3	2	2	4	®	●	®

Butt-lever action pistols

Walther LP3	C1	—	■	—	—	4	5	2	4	2	—	●	●	●
Walther LP3 Match	C1	—	■	—	—	5	5	2	5	2	—	●	●	●

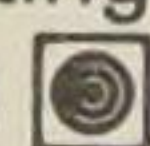
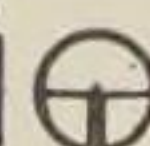
Sidelever action pistols

IGI CU400	C1/C2	—	■	—	—	4	4	3	4	2	—	●	○	●
Daisy 717	C1/C2	—	■	—	—	5	4	3	4	2	—	●	●	●
Daisy 722	C1/C2	—	—	■	—	5	4	3	4	2	—	●	●	●
Daisy 777	C1/C2	—	■	—	—	5	4	3	4	2	—	●	●	●

MULTI-STROKE PNEUMATICS

Fore-end pump action rifles

Marshall-Crosman 761XL	R1	—	■	■	—	4	3	3	3	4	—	●	®	®
Sharp Innova	R1	—	■	■	—	4	4	3	3	4	—	○	®	○
Sheridan Model C	R1	—	—	—	■	4	4	3	3	4	—	○	●	®
Smith & Wesson 77A	R1	—	—	■	—	N	3	3	3	4	—	®	●	○
Whaley-Crosman 761XL	R1	—	■	■	—	4	3	3	3	4	—	●	®	®
Crosman 2200	R2	—	—	■	—	4	3	3	3	3	—	●	●	○
Benjamin 342	R3/R2	—	—	■	—	3	3	3	3	3	—	●	●	○
Benjamin 347	R3/R2	—	■	—	—	3	3	3	3	3	—	●	●	○
Benjamin 3200	R3	—	—	■	—	2	3	3	—	2	3	®	●	®
Crosman 766	R3	■	■	—	—	4	3	3	3	3	—	●	●	○
Daisy 822	R3	—	—	■	—	3	3	3	3	3	—	®	●	®
Daisy 880	R3	■	■	—	—	3	3	3	3	3	—	○	●	○
Daisy 881	R3	■	■	—	—	3	3	3	3	3	—	○	●	○
Daisy 917	R3	—	■	—	—	4	4	3	3	3	—	●	●	●
Daisy 922	R3	—	—	■	—	4	4	3	3	3	—	●	●	●
Daisy 977	R3:M3	—	■	—	—	4	3	3	4	2	—	®	●	®
Benjamin 3100	R4	■	—	—	—	2	3	3	—	—	3	®	●	®
Benjamin 340	R4	■	—	—	—	3	3	3	—	—	3	®	●	●
Crosman 760	R4	■	■	—	—	3	3	3	3	2	—	●	●	○
Crosman 760XL	R4	■	■	—	—	3	3	3	3	2	—	●	●	○
Crosman 761XL	R4	■	■	—	—	3	3	3	3	2	—	●	●	○
Crosman 788	R5	■	—	—	—	3	3	3	—	—	3	●	●	®

Type	Class	Calibre				Rating						Availability		
		BB	.177	.22	other							GB	US	Eur ¹
Daisy 770	R5	■	—	—	—	N	3	3	—	—	3	®	●	®
Reciprocating rod rifles														
Yew-Ha 3B Dynamite	R1	—	—	—	■	N	3	3	1	1	—	®	●	●
Fore-end pump action pistols														
Benjamin 132	P1/P2	—	—	■	—	3	3	3	2	4	—	●	●	○
Benjamin 137	P1/P2	—	■	—	—	3	3	3	2	4	—	●	●	○
Crosman 1322	P1/P2	—	—	■	—	4	3	3	3	3	—	●	●	○
Crosman 1377	P1/P2	—	■	—	—	4	3	3	3	3	—	●	●	○
Benjamin 130	P4	■	—	—	—	2	3	3	—	—	3	®	●	®

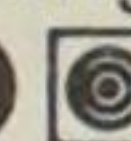
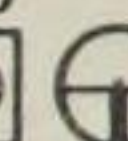
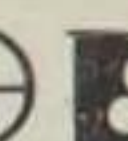
GAS POWERED

Rifles

Hämmerli 472 Match	M2	—	■	—	—	N	4	2	4	2	—	®	○	●
Hämmerli 471 Junior	M3	—	■	—	—	N	4	3	3	2	—	®	○	●
Howa 55G	R1	—	■	■	—	4	4	2	3	4	—	®	®	®
Sheridan Model F	R3	—	—	—	■	4	4	4	3	3	—	®	●	®
Crosman 70	R3/R4	—	■	—	—	3	3	4	2	3	—	®	●	®
Hämmerli Cadet	R4	—	■	—	—	N	4	3	2	2	—	®	○	●
Crosman 73	R5	■	—	—	—	3	3	4	—	—	4	®	●	®
Smith & Wesson 80G	R5	■	—	—	—	3	4	3	—	—	4	®	●	○

Pistols

Hämmerli 454 Master	C1	—	■	—	—	5	5	2	5	2	—	○	●	●
Hämmerli 452 Single	C1/C2	—	■	—	—	4	4	2	4	3	—	○	●	●
Crosman Mk I	C2	—	■	—	—	3	4	3	4	2	—	®	●	®
Crosman Mk II	C2	—	—	■	—	3	4	3	4	2	—	®	●	®
Crosman 38-T	C2	—	■	—	—	4	4	3	4	3	—	○	●	®
Smith & Wesson 78G	C2	—	—	■	—	4	4	3	4	2	—	®	●	○
Smith & Wesson 79G	C2	—	■	—	—	4	4	3	4	2	—	®	●	○
Sheridan EB	P2	—	—	—	■	5	3	4	2	4	—	®	●	®
Crosman 38-C	P4	—	■	—	—	3	4	3	—	—	5	○	●	®
Crosman 44	P4	—	■	—	—	3	4	3	—	—	4	®	●	®
Crosman 454	P5	■	—	—	—	2	4	2	—	—	4	®	●	®
Crosman 1600	P5	■	—	—	—	3	4	2	—	—	5	®	●	®
Daisy 1200	P5	■	—	—	—	4	4	3	—	—	5	®	●	●
Healthways 9401 Plainsman	P5	■	—	—	—	4	4	2	—	—	5	®	●	®
Healthways 9404 Shorty	P5	—	—	■	—	3	4	2	—	—	5	®	●	®
Healthways 9405 Plainsmaster	P5	■	—	—	—	3	4	2	—	—	4	®	●	®

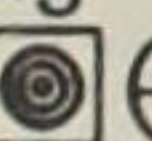
Type	Class	Calibre				Rating						Availability		
		BB	.177	.22	other							GB	US	Eur ¹
Healthways 9406 Plainsmaster	P5	—	—	■	—	3	4	2	—	—	4	®	●	®

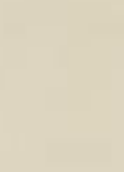
SPRING-AIR

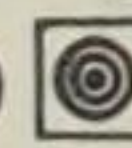
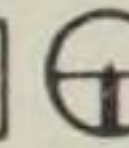
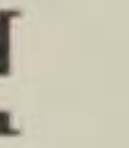
Barrel-cocking rifles

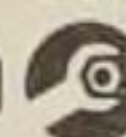
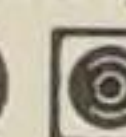
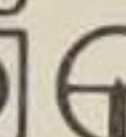
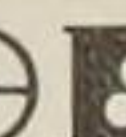
M&G Original Diana 66	M1	—	■	—	—	5	4	2	5	2	—	●	○	●
Walther LGV Spezial	M1	—	■	—	—	3	5	3	5	2	—	●	○	●
Walther LGV Spezial Junior	M1	—	■	—	—	3	5	3	5	2	—	○	®	○
Walther LGV Spezial 3-position	M1	—	■	—	—	3	5	3	5	2	—	○	®	○
Walther LGV Spezial mit Tirolerschaft	M1	—	■	—	—	N	5	3	5	2	—	○	®	○
M&G Original Diana 65	M1/M2	—	■	—	—	N	4	2	4	2	—	○	○	●
M&G Original Diana 60	M2	—	■	—	—	4	4	2	4	2	—	●	●	●
Weihrauch HW55 Match	M2	—	■	—	—	4	5	4	5	2	—	●	○	●
Weihrauch HW55T	M2	—	■	—	—	4	5	4	5	3	—	●	●	●
Haenel 303-8-S	M2	—	■	—	—	5	3	3	4	2	—	○	®	●
Weihrauch HW55SM	M2/M3	—	■	—	—	3	5	4	4	3	—	●	●	●
Weihrauch HW55MM	M2/M3	—	■	—	—	3	5	4	4	3	—	○	○	○
Airgunaid TR2	M3	—	■	—	—	3	3	4	4	3	—	●	®	®
Anschütz 335S	M3	—	■	—	—	5	5	4	4	3	—	●	®	●
Arizmendi Norica 80-G	M3	—	■	■	—	3	3	3	3	2	—	●	®	●
BSA Mercury Target	R1/R2	—	■	—	—	N	4	3	4	3	—	○	®	®
Feinwerkbau 124	R1/R2	—	■	—	—	5	4	3	3	5	—	●	●	●
Feinwerkbau 127	R1/R2	—	—	■	—	5	4	3	3	5	—	●	●	●
Normay Vixen	R1/R2	—	■	■	—	4	5	3	3	5	—	●	®	®
Anschütz 335	R2/R1	—	■	■	—	5	5	4	3	4	—	●	®	●
M&G Original Diana 45	R2/R1	—	■	■	—	5	4	2	3	5	—	●	●	●
Weihrauch HW35	R2/R1	—	■	■	—	3	4	3	3	4	—	●	●	●
Weihrauch HW35LS	R2/R1	—	■	■	—	4	4	3	3	5	—	○	○	○
Weihrauch HW35L	R2/R1	—	■	■	—	4	5	3	3	5	—	●	●	●
Weihrauch HW35B	R2/R1	—	■	■	—	3	4	3	3	5	—	●	●	●
Weihrauch HW35EB	R2/R1	—	■	■	—	4	5	3	3	5	—	®	○	®
Weihrauch HW35E	R2/R1	—	■	■	—	4	5	3	3	5	—	●	●	●
Anschütz LG333	R2	—	■	■	—	3	4	4	3	4	—	●	®	●
BSF Bavaria 55	R2	—	■	■	—	4	3	4	3	4	—	●	●	●
BSF Bavaria 55DL	R2	—	■	■	—	4	3	4	3	4	—	○	○	●
BSF S60	R2	—	■	■	—	3	3	4	3	3	—	○	○	●
BSF S70	R2/R1	—	■	■	—	3	4	4	3	4	—	○	○	●
BSA Mercury Mk 3	R2	—	■	■	—	5	4	3	3	4	—	●	○	○
BSA Mercury S	R2	—	■	■	—	4	5	3	3	4	—	●	®	®

Type	Class	Calibre				Rating							Availability		
		BB	.177	.22	other								GB	US	Eur ¹
MAG Mercury Magnum	R2	—	—	—	■	5	4	3	3	4	—		●	®	®
Webley Vulcan	R2	—	■	■	—	5	4	3	3	4	—		●	○	○
Webley Vulcan SE	R2	—	■	■	—	4	5	3	3	4	—		●	○	®
M&G Original Diana 35	R2/R3	—	■	■	—	3	4	2	3	4	—		●	●	●
M&G Original Diana 35S	R2/R3	—	■	■	—	4	4	2	3	4	—		●	●	●
Weihrauch HW50 M/II	R2/R3	—	■	■	—	4	3	3	3	3	—		●	●	●
Weihrauch HW50 M/II Monte Carlo	R2/R3	—	■	■	—	4	3	3	3	3	—		●	●	●
Weihrauch HW50S	R2/R3	—	■	■	—	4	4	3	3	4	—		●	●	●
Weihrauch HW50S Monte Carlo	R2/R3	—	■	■	—	4	4	3	3	4	—		●	●	●
Weihrauch HW50SE	R2/R3	—	■	■	—	4	4	3	2	4	—		○	○	●
Weihrauch HW50SE Monte Carlo	R2/R3	—	■	■	—	4	4	3	2	4	—		○	○	●
Airgunaid SP5	R3	—	—	—	■	3	3	4	3	3	—		●	®	®
Anschütz 330	R3	—	■	—	—	3	4	4	3	3	—		●	®	●
Arizmendi Norica 73-T	R3	—	■	■	—	3	3	4	3	3	—		●	®	●
Arizmendi Norica 80-C	R3	—	■	■	—	4	3	3	3	3	—		●	®	●
Arizmendi Norica 80-G	R3	—	■	■	—	3	3	3	3	2	—		●	®	●
BSF Bavaria 45	R3	—	■	—	—	3	3	3	2	3	—		○	®	●
BSF Bavaria 50	R3	—	■	—	—	3	3	3	2	3	—		®	®	●
BSA Meteor Mk 5	R3	—	■	■	—	4	3	3	3	3	—		●	○	○
BSA Super Meteor Mk 5	R3	—	■	■	—	4	3	3	3	3	—		●	○	○
Chinese State Factories Arrow	R3	—	■	—	—	3	2	4	2	2	—		●	®	●
El Gamo Expo 300	R3	—	■	■	—	3	3	4	2	3	—		®	●	●
El Gamo Statical	R3	—	—	■	—	2	3	3	3	3	—		●	®	●
El Gamo 600	R3	—	■	■	—	3	3	4	3	3	—		®	®	●
Feinwerkbau 121	R3	—	■	—	—	2	4	3	3	3	—		○	®	®
Haenel 303 – 5	R3	—	■	—	—	4	3	3	3	3	—		○	®	●
Haenel 303 – 6	R3	—	■	—	—	4	3	3	3	3	—		®	®	○
Izhevskii Baikal/Vostok	R3	—	■	—	—	3	2	4	2	3	—		●	●	●
Manufrance Carabine	R3	—	■	■	—	3	3	3	3	3	—		○	®	®
M&G Original Diana LG25DS	R3	—	■	■	—	4	4	2	3	3	—		●	●	●
M&G Original Diana 27	R3	—	■	■	—	3	3	2	3	3	—		●	●	●
M&G Original Diana 27S	R3	—	■	■	—	4	4	2	3	3	—		●	●	●
Milbro Diana G80	R3	—	■	■	—	3	3	4	3	3	—		●	○	○
Predom Lucznik Kl.188	R3	—	■	—	—	N	2	4	2	3	—		○	®	○
Slavia 630	R3	—	■	—	—	4	3	3	2	3	—		○	®	○
Slavia 631	R3	—	■	—	—	N	3	3	3	3	—		○	®	○
Telly LG522	R3	—	■	—	—	3	3	3	2	3	—		●	®	○
Telly LG527	R3	—	—	■	—	3	3	3	2	3	—		●	®	○

Type	Class	Calibre				Rating						Availability		
		BB	.177	.22	other							GB	US	Eur ¹
Webley Hawk Mk 3	R3	—	■	■	—	N	4	3	3	3	—	●	●	○
Weihrauch HW30 M/II	R3	—	■	—	—	3	4	3	2	3	—	●	●	●
Weihrauch HW30 M/II Monte Carlo	R3	—	■	—	—	3	4	3	2	3	—	●	●	●
Weihrauch HW30S	R3	—	■	—	—	4	4	3	2	3	—	●	●	●
Weihrauch HW30S Monte Carlo	R3	—	■	—	—	4	4	3	2	3	—	●	●	●
BSF Bavaria 35	R3/R4	—	■	—	—	3	3	3	2	3	—	○	®	●
BSF Media	R3/R4	—	■	—	—	3	3	3	2	3	—	●	®	●
BSA Buccaneer	R3/R4	—	■	■	—	5	4	2	3	3	—	●	®	®
Juaristi Ideal	R3/R4	—	■	■	—	2	3	3	2	2	—	®	®	
Juaristi Super-Especial	R3/R4	—	■	■	—	3	3	3	3	3	—	®	®	
Juaristi SE con Carrillera	R3/R4	—	■	■	—	3	3	3	3	3	—	®	®	
Milbro Diana G79	R3/R4	—	■	■	—	N	3	4	3	3	—	●	○	○
Predom Lucznik Kl. 187	R3/R4	—	■	—	—	N	2	4	2	3	—	®	®	○
Arizmendi Norica 61-F	R4	—	■	■	—	2	2	4	2	2	—	®	®	
Arizmendi Norica 61-C	R4	—	■	■	—	3	2	4	2	2	—	●	®	●
Bascaran Cometa V	R4	—	■	■	—	2	2	4	2	2	—	○	®	
Bascaran Cometa VII	R4	—	■	■	—	3	3	4	2	2	—	○	®	
El Gamo Cadet	R4	—	■	—	—	4	4	3	3	2	—	●	○	●
El Gamo Expo 200	R4	—	■	■	—	4	3	4	2	2	—	●	●	●
El Gamo Expomatic	R4	—	■	—	—	3	4	3	—	—	4	●	●	●
El Gamo 68	R4	—	■	■	—	4	3	4	2	3	—	●	●	●
El Gamo Gamatic	R4	—	■	—	—	3	4	3	—	—	4	●	●	●
M&G Original Diana 25	R4	—	■	—	—	3	3	4	2	2	—	●	●	●
M&G Original Diana 25D	R4	—	■	—	—	4	4	2	2	3	—	●	●	●
Milbro Diana G76	R4	—	■	■	—	3	3	4	2	2	—	●	®	○
Milbro Diana G77	R4	—	■	■	—	3	3	4	2	2	—	●	®	○
Telly LG422	R4	—	■	—	—	?	3	3	2	2	—	®	®	○
Weihrauch HW25	R4	—	■	—	—	4	4	3	2	2	—	®	®	○
IGI 214	R4/R5	—	■	—	—	3	3	4	1	1	—	○	®	●
Haenel 300 – 7	R4/R5	—	■	—	—	N	3	3	2	2	—	®	®	
M&G Original Diana LG22	R5/R4	—	■	—	—	4	3	5	2	2	—	●	●	●
M&G Original Diana LG23	R5/R4	—	■	—	—	4	3	4	2	2	—	●	●	●
Predom Lucznik Kl. 141	R5/R4	—	■	—	—	N	2	4	2	2	—	®	®	○
BSF Junior	R5	—	■	—	—	3	3	3	2	2	—	○	®	●
IGI 215	R5	—	■	—	—	3	3	4	1	1	—	○	®	●
BSF Bavaria 30	R5	—	■	—	—	2	3	3	2	2	—	®	®	●
M&G Original Diana 15	R5	—	■	—	—	N	2	5	1	1	—	●	●	●
M&G Original Diana 16	R5	—	■	—	—	3	3	5	1	1	—	●	●	●

Type	Class	Calibre				Rating							Availability		
		BB	.177	.22	other								GB	US	Eur ¹
Milbro Diana G85/1 Bob Cat	R5	—	■	—	—	5	4	4	2	1	—	—	●	®	®
Slavia 624	R5	—	■	—	—	3	3	4	2	2	—	—	○	®	○
Marksman 740	R5	■	■	—	—	2	3	4	2	2	—	—	○	●	®
Marksman 742	R5	■	■	—	—	2	3	4	2	2	—	—	○	●	®
Lever-action rifles															
Anschütz LG220	M1	—	■	—	—	N	4	3	4	2	—	—	®	®	®
Daisy 95 Woodstock	R5	■	—	—	—	3	3	4	—	—	3	—	●	●	○
Daisy 99 Champion	R5	■	—	—	—	4	3	4	—	—	4	—	●	●	○
Daisy 105 Pal	R5	■	—	—	—	3	3	4	—	—	3	—	●	●	○
Daisy 111 Western Carbine	R5	■	—	—	—	3	3	4	—	—	3	—	®	●	®
Daisy 499 Target	R5	■	—	—	—	4	3	4	2	—	—	—	®	●	®
Daisy 1894 Spittin' Image	R5	■	—	—	—	5	4	3	—	—	5	—	●	●	●
Daisy 1938 Red Ryder	R5	■	—	—	—	3	3	4	—	—	3	—	○	●	®
Sidelever-cocking rifles															
Anschütz 250	M1	—	■	—	—	4	5	3	5	2	—	—	●	●	●
Feinwerkbau 300S	M1	—	■	—	—	4	5	2	5	2	—	—	●	●	●
Feinwerkbau 300S Universal	M1	—	■	—	—	5	5	2	5	2	—	—	●	●	●
Feinwerkbau 300S Laufende Scheibe	M1	—	■	—	—	5	5	2	5	4	—	—	●	●	●
Feinwerkbau 300S Junior	M1	—	■	—	—	5	5	2	5	2	—	—	●	●	●
Feinwerkbau 300S L	M1	—	■	—	—	4	5	2	5	2	—	—	○	○	●
M&G Original Diana 75	M1	—	■	—	—	5	5	2	5	2	—	—	●	●	●
M&G Original Diana 75HV	M1	—	■	—	—	5	5	2	5	2	—	—	●	●	●
Yew-Ha Target	M1	—	■	—	—	3	4	2	4	2	—	—	○	®	○
Haenel LG.121	M1/M2	—	■	—	—	N	4	3	4	2	—	—	®	®	®
Webley Osprey Supertarget	M2	—	■	—	—	4	4	3	4	2	—	—	●	○	®
Hämmerli 403	M3	—	■	—	—	3	3	3	4	3	—	—	●	®	●
Sussex Armoury Jackal AR7	R1/R2	—	—	■	—	3	3	3	2	4	—	—	●	®	®
Sussex Armoury Jackal Firepower	R1/R2	—	—	■	—	3	3	3	3	4	—	—	●	®	®
Sussex Armoury Jackal Hi-Power	R1/R2	—	—	■	—	3	3	3	3	4	—	—	●	®	®
Sussex Armoury Jackal HP Woodstock	R1/R2	—	—	■	—	3	4	3	3	5	—	—	●	®	®
Sussex Armoury Jackal Parabellum	R2	—	■	■	—	3	3	3	2	3	—	—	●	®	®
Sussex Armoury Jackal Parabellum Woodstock (Jackal Target)	R2	—	■	■	—	3	3	3	3	3	—	—	●	®	®
Sussex Armoury Jackal Woodsman	R2	—	—	■	—	3	3	3	2	4	—	—	●	®	®

Type	Class	Calibre				Rating							Availability		
		BB	.177	.22	other								GB	US	Eur ¹
Hämmerli 400	R3	—	■	■	—	2	3	3	2	3	—		●	®	●
Hämmerli 401	R3	—	■	■	—	3	3	3	3	3	—		●	®	●
Hämmerli 402	R3	—	■	■	—	3	3	3	3	3	—		●	®	●
Hämmerli 420	R3	—	■	■	—	3	3	3	2	3	—		●	®	●
Webley Osprey	R3	—	■	■	—	4	4	3	3	4	—		●	●	○
Underlever-cocking rifles															
BSA Airsporter S	R1/R2	—	■	■	—	4	5	3	3	5	—		●	○	○
BSA Airsporter	R2	—	■	■	—	4	4	3	3	4	—		●	○	○
Chinese State Factories Lion	R2/R3	—	■	—	—	3	2	3	2	3	—		●	®	®
BSF S54	R3/R2	—	■	■	—	3	4	3	3	3	—		○	®	●
BSF S54N	R3/R2	—	■	■	—	3	4	3	3	3	—		○	®	●
BSF S54B	R3/R2	—	■	■	—	3	5	3	3	3	—		○	®	●
BSF S54M	R3/R2	—	■	■	—	3	5	3	3	3	—		○	®	●
M&G Original Diana 50	R3/R2	—	■	■	—	4	4	2	3	4	—		●	○	●
Telly LG15V	R3/R2	—	—	■	—	3	3	3	3	3	—		●	®	●
Bolt-cocking rifles															
Haenel 311	M2	—	■	—	—	4	4	2	4	3	—		○	®	●
Anschütz LG275	R5	■	—	—	—	3	4	2	—	—	5		○	®	●
Haenel 310 – 8 and 310 – 9	R5	■	—	—	—	3	3	3	—	—	5		®	®	○
M&G Original Diana 30	R5	■	—	—	—	3	5	2	—	—	5		®	®	○
Push-in-barrel cocking rifle															
Crosman M1 Carbine	R5	■	—	—	—	4	3	4	1	1	4		●	●	○
Barrel-cocking pistols															
M&G Original Diana 10	C1	—	■	—	—	5	5	2	5	2	—		●	●	●
M&G Original Diana 6	C2:P3	—	■	—	—	3	4	2	4	3	—		●	●	●
M&G Original Diana 6G	C2:P3	—	■	—	—	4	4	2	4	3	—		●	●	●
M&G Original Diana 6M	C2:P3	—	■	—	—	4	4	2	4	2	—		●	●	●
LP 68 Barthelmes	C3:P3	—	■	—	—	3	4	3	3	3	—		®	®	●
LP 77 Barthelmes	C3:P3	—	■	—	—	4	4	3	3	3	—		®	®	●
BSF 20ME	C3:P2/P3	—	■	—	—	3	3	4	3	3	—		●	●	●
IGI 203	C3:P4	—	■	—	—	4	2	4	3	2	—		●	●	●
M&G Original Diana 5	C3:P3	—	■	■	—	3	3	3	3	3	—		●	●	●
M&G Original Diana 5G	C3:P3	—	■	■	—	4	3	3	3	3	—		●	●	●
Predom Lucznik Kl. 170	C3:P4	—	■	—	—	4	4	2	3	3	—		○	®	○
Slavia Tex 086	C3:P4	—	■	—	—	5	3	4	3	2	—		●	®	●
Walther LP53	C3:P4	—	■	—	—	3	5	2	4	3	—		●	●	●
Weihrach HW70	C3:P4	—	■	—	—	5	3	3	3	2	—		●	●	●

Type	Class	Calibre				Rating						Availability		
		BB	.177	.22	other							GB	US	Eur ¹
EmGe LP3A	C3:P3	—	■	—	—	3	3	3	3	3	—	●	○	●
EmGe LP100	C3:P3	—	■	—	—	4	3	3	3	3	—	®	®	
BSA Scorpion	P1/P2	—	■	■	—	4	4	3	3	4	—	●	●	○
Manufrance Pistolet	P2	—	■	■	—	4	2	3	3	3	—	○	®	®
BSF 20 and 20E	P2/P3	—	■	—	—	3	3	3	2	3	—	●	●	●
Webley Hurricane	P2/P3	—	■	■	—	4	4	3	3	4	—	●	●	○
Webley Tempest	P2/P3	—	■	■	—	5	4	3	2	4	—	●	●	○
Milbro Diana G5 Cougar	P3	—	■	■	—	5	3	3	2	4	—	●	®	○
Webley Typhoon	P3	—	■	■	—	4	4	3	3	3	—	●	○	○
M&G Original Diana LP6	P3:C2	—	■	—	—	3	4	2	4	3	—	●	●	●
M&G Original Diana LP6G	P3:C2	—	■	—	—	4	4	2	4	3	—	●	●	●
M&G Original Diana LP6M	P3:C2	—	■	—	—	4	4	2	4	2	—	●	●	●
Barthelmes LP68	P3:C3	—	■	—	—	3	4	3	3	3	—	®	®	●
Barthelmes LP77	P3:C3	—	■	—	—	4	4	3	3	3	—	®	®	●
M&G Original Diana LP5	P3:C3	—	■	■	—	3	3	3	3	3	—	●	●	●
M&G Original Diana 5G	P3:C3	—	■	■	—	4	3	3	3	3	—	●	●	●
EmGe LP3A	P3:C3	—	■	—	—	3	3	3	3	3	—	●	○	●
EmGe LP100	P3:C3	—	■	—	—	4	3	3	3	3	—	®	®	
Chinese State Factories I-type	P4	—	■	—	—	2	2	5	1	2	—	●	®	®
IGI 202	P4	—	■	—	—	3	2	4	2	2	—	●	○	●
IGI 203	P4:C3	—	■	—	—	4	2	4	3	2	—	●	●	●
IGI 205	P4	—	■	—	—	3	2	5	2	2	—	○	®	●
IGI 206	P4	—	■	—	—	3	2	5	2	2	—	○	®	●
IGI 216	P4	—	■	—	—	4	2	4	3	2	—	●	☞	●
Predom Lucznik KI. 170	P4:C3	—	■	—	—	4	4	2	3	3	—	○	®	○
Slavia Tex 086	P4:C3	—	■	—	—	5	3	4	3	2	—	●	®	●
Walther LP53	P4:C3	—	■	—	—	3	5	2	4	3	—	●	●	●
Barthelmes LP1	P5	—	■	—	—	3	4	5	1	1	—	○	®	●
Barthelmes LP2	P5	—	■	—	—	5	4	4	2	2	—	○	®	●
Healthways Topscore 9100	P5	■	—	—	—	4	3	4	—	—	4	○	●	®
Weihrauch HW70	P4:C3	—	■	—	—	5	3	3	3	2	—	●	●	●
Sidelever-cocking pistols														
Feinwerkbau LP65	C1	—	■	—	—	5	5	2	5	2	—	●	●	●
Feinwerkbau LP80	C1	—	■	—	—	5	5	2	5	2	—	●	●	●
Schmidt HS71	P5	■	—	—	—	3	3	3	—	—	3	®	®	®
Underlever-cocking pistols														
El Gamo Center	C3:P4	—	■	—	—	4	3	3	4	3	—	●	●	●
Daisy 188	P5	■	■	—	—	3	3	3	2	1	—	®	●	●

Type	Class	Calibre				Rating						Availability		
		BB	.177	.22	other							GB	US	Eur ¹
Daisy 1188	P5	■	—	—	—	3	3	3	—	—	3	®	●	®
Push-in-barrel cocking pistols														
Harrington Gat	P5	—	■	—	—	3	3	5	—	—	2	●	○	®
M&G Original Diana LP2	P5	—	■	—	—	2	3	5	—	—	2	●	●	●
Milbro Diana G2/5	P5	—	■	—	—	3	3	4	—	—	2	●	®	®
Milbro Diana G3/1 (or SP50)	P5	—	■	—	—	3	3	5	—	—	2	●	®	®
Schmidt HS9A	P5	—	■	—	—	2	3	5	—	—	2	®	®	®

SPRING GUNS

Hammer-cocking pistol

Daisy 179	P5	■	—	—	—	4	3	3	—	—	4	●	●	●
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